DOCUMENT RESUME

ED 359 034 SE 053 333

AUTHOR White, Patricia E.
TITLE Women and Minorities in Science and Engineering: An Update.
INSTITUTION National Science Foundation, Washington, D.C.
REPORT NO NSF-92-303
PUB DATE Jan 92
NOTE 196p.; For the 1990 version updated by this report, see ED 323 112.
AVAILABLE FROM National Science Foundation, Washington, DC 20550.
PUB TYPE Reports - General (140) -- Statistical Data (110)

EDRS PRICE MF01/PC08 Plus Postage.
DESCRIPTORS American Indians; Asian Americans; Black Students; College Science; Doctoral Degrees; Elementary School Science; Elementary Secondary Education; Engineering Education; Federal Government; *Females; *Graduate Study; Higher Education; Hispanic Americans; *Minority Groups; Physical Disabilities; *Science Careers; *Science Education; Science Instruction; Secondary School Science; *Undergraduate Study
IDENTIFIERS Hispanic American Students

ABSTRACT

Effective policy formulation depends on an assessment of the current situation and of recent trends in science and engineering participation rates of all segments of U.S. society. This volume, the sixth in a series, is designed to provide such an assessment. It has been prepared for the Congress, the administration, and others who influence the direction of the U.S. science and engineering effort and who are concerned with maintaining equal opportunity and equal treatment for women and minorities as they participate in this undertaking. The chapters in this book are: (1) Women in Science and Engineering; (2) Education and Training of Women in Science and Engineering; (3) Minorities in Science and Engineering; (4) Education and Training of Minorities in Science and Engineering; and (5) Persons with Physical Disabilities in Science and Engineering. (PR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED359034

women and minorities in science and engineering: an update

National Science Foundation

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

SE 053 333

January 1992

NSF 92-303

BEST COPY AVAILABLE

women and minorities in science and engineering: an update

Update prepared by:

Patricia E. White, Ph.D.

National Science Foundation

January 1992

NSF 92-303

foreword

The decade of the nineties is already proving to be a challenge for U.S. science and technology. As cold war tensions ease and attention is diverted increasingly to economic and technological competitive arenas, both public and private sector decisionmakers seek detailed information about the supply and quality of human resources available to drive the Nation's science and technology enterprise. It is, after all, the national science and technology enterprise to which we must turn if we are to sustain high societal levels of education, environmental quality, medical research, national security, and technological competitiveness.

It is apparent that not all available human resources are being drawn into that enterprise. Historically women, racial and ethnic minorities, and persons with physical disabilities have been disproportionately represented in science and engineering. Further, they apparently encounter market conditions that may discourage both their entry into and their sustained participation in science and engineering fields.

Effective policy formulation depends on an assessment of the current situation and of recent trends in science and engineering participation rates of all segments of our society. This volume, the sixth in a series, is designed to provide such an assessment. It has been prepared for the Congress, the administration, and others who influence the direction of the U.S. science and engineering effort and who are concerned with maintaining equal opportunity and equal treatment for women and minorities as they participate in this important undertaking.

Walter E Massey

Walter E. Massey
Director
National Science Foundation

acknowledgements

This report was updated from the 1990 version within the Division of Science Resources Studies (SRS). Patricia E. White, Senior Science Resources Analyst, Education and Human Resources Program (EDU), coordinated the preparation of the report, wrote the text, and compiled data and charts. Donna Fossum (former Acting Deputy Division Director, SRS) prepared the 1992 Status Update. Several SRS staff members provided data, prepared charts, reviewed sections of the manuscript, and assisted in a variety of ways in its production. Special acknowledgment is due John Tsapogas, Science Resources Analyst, Science and Engineering Personnel Program for his review of the manuscript. Mary A. Golladay, Program Director, EDU, and Kenneth M. Brown, Director, SRS, provided overall supervision. Editorial Experts, Inc., provided professional editing services. Patricia Hughes of NSF's Printing Services Branch coordinated the production of the document.

The report has benefited from comments provided by the National Science Foundation's Committee on Equal Opportunities in Science and Engineering.

contents

LIST OF TABLES vii

LIST OF CHARTS ix

1992 STATUS UPDATE: WOMEN AND MINORITIES IN SCIENCE AND ENGINEERING xi

INTRODUCTION xv

SECTION I. WOMEN 1

Chapter 1. Women in Science and Engineering 3

Chapter 2. Education and Training of Women in Science and Engineering 15

SECTION II. MINORITIES 27

Chapter 3. Minorities in Science and Engineering 29

Chapter 4. Education and Training of Minorities in Science and Engineering 39

SECTION III. PERSONS WITH PHYSICAL DISABILITIES 61

Chapter 5. Persons With Physical Disabilities in Science and Engineering 63

APPENDIXES 67

Appendix A. Technical Notes 69

Appendix B. Statistical Tables 73

list of tables

1-1 Employed scientists and engineers, by field and sex: 1988 [Percentages] 5

1-2 Doctoral scientists and engineers in 4-year colleges and universities, by tenure status, academic rank, and sex: 1989 [Percentages] 8

1-3 Field distribution of women doctoral scientists and engineers, by racial group: 1989 [Percentages] 12

2-1 Advanced placement examination scores for female and male test-takers: 1990 19

2-2 GRE scores for female and male test-takers, by undergraduate major: 1987 22

2-3 S&E bachelor's degrees granted to women, by field: 1989 23

2-4 Advanced degrees granted to women in science and engineering, by field: 1989 24

3-1 Selected characteristics of employed persons with degrees in science and engineering, by degree level 32

4-1 Advanced placement scores for black and white test-takers: 1990 42

4-2 GRE scores for black and white test-takers, by undergraduate major: 1987 43

4-3 Advanced placement scores for Asian and white test-takers: 1990 47

4-4 GRE scores for Asian and white test-takers, by undergraduate major: 1987 49

4-5 Advanced placement examination scores for Native American and white test-takers: 1990 52

4-6 GRE scores for Native American and white test-takers, by undergraduate major: 1987 53

4-7 Advanced placement examination scores for Hispanic and all test-takers: 1990 56

4-8 GRE scores for Hispanic and all test-takers, by undergraduate major: 1987 58

5-1 Severe and nonsevere work disabilities, by age: 1981-91 63

5-2 Percent of disabled in the labor force, by sex and severity of disability, 1981-91 64

5-3 Disabled postsecondary students, by type of disability: fall 1986 65

list of charts

1-1 Women as a percentage of employed scientists and engineers, by field: 1988 5

1-2 Average annual employment growth rates of scientists and engineers, by field and sex: 1978-88 5

1-3 Average annual employment growth rates of doctoral scientists and engineers, by field and sex: 1979-89 6

1-4 Employed doctoral scientists and engineers, by field and sex: 1989 6

1-5 Percentages of doctoral women and men with fewer than 10 years of work experience, by field: 1989 7

1-6a Unemployment rates of doctoral scientists and engineers, by sex and field: 1989 9

1-6b Unemployment rates of S&E bachelor's recipients, by sex and field: 1990 10

1-6c Unemployment rates of S&E master's recipients, by sex and field: 1990 10

1-7 Underemployment rates of doctoral scientists and engineers, by sex and field: 1989 11

1-8 Women salaries as a percentage of men's salaries, by field and level of degree 11

1-9 Field distribution of employed women scientists and engineers—Hispanic women and all women: 1989 14

2-1 SAT scores, by sex: 1981-91 17

2-2 Science and mathematics achievement tests scores, by sex: 1990 18

2-3 Proportions of students who took science and mathematics advanced placement tests who were female: 1990 19

2-4 Intended undergraduate S&E major by sex: 1991 20

2-5 Intended career choices of female and male freshmen majoring in S&E fields, by selected occupation: 1990 21

2-6 GRE scores, by sex—all test-takers and test-takers who majored in science and engineering: 1987 22

2-7 Women as a percentage of graduate enrollment, by S&E field: 1990 23

2-8 Major sources of support for 1990 U.S. citizen S&E doctorate recipients, by sex 26

3-1 Minorities as a percentage of employed scientists and engineers: 1988 30

3-2 Field distribution of employed black and white scientists and engineers: 1988 31

3-3 Field distribution of employed Asian and white scientists and engineers: 1988 33

3-4 Field distribution of employed Native American and white scientists and engineers: 1988 35

3-5 Field distribution of employed Hispanic and all scientists and engineers: 1988 36

4-1 SAT scores of black and white college-bound seniors: 1981-91 41

4-2 SAT mathematics scores for black and white college-bound seniors, by intended S&E major: 1991 42

4-3 Intended career choices of black and white freshmen, by selected occupation: 1990 43

4-4 Black S&E doctorate recipients, by citizenship: 1980-90 45

4-5 SAT scores for Asian and white college-bound seniors: 1981-91 46

4-6 SAT mathematics scores of Asian and white college-bound seniors, by intended S&E major: 1991 48

4-7 Intended career choices of Asian and white freshmen, by selected occupation: 1990 48

4-8 Asian S&E doctorate recipients, by citizenship: 1980-90 50

4-9 SAT scores of Native American and white college-bound seniors: 1981-91 51

4-10 SAT mathematics scores of Native American and white college-bound seniors, by intended S&E major: 1991 52

4-11 SAT mathematics scores of Hispanic and all college-bound seniors: 1981-91 55

4-11a SAT verbal scores of Hispanic and all college-bound seniors: 1981-91 55

4-12 SAT mathematics scores of Hispanic and all college-bound seniors, by intended S&E major: 1991 57

4-13 Intended career choices of Hispanic and all freshmen, by selected occupation: 1990 57

4-14 Hispanic S&E doctorate recipients, by citizenship: 1980-90 59

5-1 Field distribution of all employed scientists and engineers and employed scientists and engineers with physical disabilities: 1986 64

5-2 Major field of study of undergraduate students, by disability status: fall 1986 65

5-3 Major field of study of graduate students, by disability status: fall 1986 65

1992 status update

WOMEN AND MINORITIES IN SCIENCE AND ENGINEERING

Today, the majority of the American work force is composed of women and minorities. Their proportion of the workforce is growing steadily. As a result, all occupations and professions—including all fields of science and engineering—must now look increasingly to women and minorities to replenish their stock of trained personnel if they wish to employ American workers.

The direct connection between the activities of scientists and engineers and the ability of the United States to compete technologically in the world economy makes the health of these professions particularly critical determinants of the Nation's future. As a result, U.S. technological competitiveness and the condition of the Nation's human resources in science and engineering cannot be considered separate issues. In a very real sense, the ability of the United States to retain and improve its position as a world economic power depends heavily on the Nation's ability to recruit, train, and retain talented scientists and engineers.

Despite notable increases in recent years, women and minorities continue to be significantly underrepresented among the ranks of the Nation's scientists and engineers in proportion to their numbers in the overall U.S. work force.

- At a time when women constitute 51 percent of the total population and 45 percent of the total work force, they constitute only 16 percent of all scientists and engineers employed in the United States. The pattern for most minorities is similar.
- Although blacks constitute 12 percent of the total population and 11 percent of the total work force, they constitute only 3 percent of all scientists and engineers employed in the United States.
- Although Hispanics constitute 8 percent of the total population and 5 percent of the total work force, they constitute only 2 percent of all scientists and engineers employed in the United States.
- Only for Americans of Asian origin does the pattern change: although this group constitutes 3 percent of the total population and 2 percent of the total work force, it accounts for 5 percent of all scientists and engineers employed in the United States.
- The lack of reliable data on Native American and disabled scientists and engineers makes it difficult to accurately compare their participation in these professions with their representation in the general work force. However, it appears that they too are underrepresented.

The underrepresentation of women and minorities is most pronounced in fields of engineering and in physical science fields. In the life sciences as well as in the social and behavioral sciences women and minorities now constitute a significant proportion of the membership.

CAUSES OF UNDERREPRESENTATION

A number of factors contribute to the underrepresentation of women and minorities in science and engineering. Although the choice of occupation is clearly the product of many diverse factors, what is emerging is a picture that includes a progression of events, beginning early in the educational process, that cumulatively operate to divert many women and minorities from educational tracks that lead to careers in science and engineering.

Because of the need for a solid foundation in the basic principles of math and science, the training of America's future scientists and engineers does not begin in graduate or undergraduate school or even high school. It begins in primary school.

On standardized tests of mathematics achievement at the primary school level, boys and girls perform at about the same levels. By high school, however, the performance of young women on math achievement tests falls slightly and thereafter remains slightly lower than that of young men. In science, the trend begins even earlier: the achievement scores of girls are slightly lower than those of boys by the time they are 9 years old and the differences increase at each level.

However, the gap between mathematics scores on standardized tests of male and female high school students has begun to narrow. Over the past decade the scores of young women on the mathematics portion of the Scholastic Aptitude Test (SAT) have increased more rapidly than those of young men, but in 1991 the average gap between the scores of men and women remains substantial at 44 points. Furthermore, the gap between the SAT mathematics scores of high school men and women persists even when intended college majors are considered (i.e., when aspiring engineers who are women are compared with aspiring engineers who are men). Nevertheless, today's high school women are slightly more likely than high school men to major in a science field in college. In marked contrast, high school men are significantly more likely to choose engineering as a college major than are high school women. Once in college, however, women intending to major in science or engineering are more likely to plan careers in clinical psychology, social work, and law, whereas their male counterparts more often plan careers in engineering and computer programming.

The scores on high school-level standardized mathematics tests of all minorities have increased steadily over the past decade, but with the exception of Asians, the scores of minorities continue to lag significantly behind those of white students. In 1991, the average score of blacks on the mathematics portion of the SAT was 104 points below that of whites (385 versus 489). Similarly, the average score of Native Americans in 1991 was 52 points below that of whites (437 versus 489). The average scores for Hispanics in 1991 fell between those of blacks and Native Americans, and varied somewhat depending on whether the Hispanics were of Mexican, Puerto Rican, or Latin American origin. In marked contrast, the average score of Asians on the mathematics component of the SAT was 41 points higher than that of whites.

The ultimate career goals of minority students planning to pursue college majors in a science or engineering field at 4-year institutions differ markedly from those of their white counterparts. For example, black college freshmen are more likely to aspire to careers in medicine, computer programming, and law than are whites. Asians aspire to careers in engineering and medicine in higher proportions than do whites. Hispanics are more inclined to pursue careers in business management, engineering, law, or medicine than are their non-Hispanic counterparts. In contrast, disproportionate numbers of white freshmen intend to pursue careers in elementary and secondary education. Financial constraints are more likely to deter the educational and career plans of minority students than those of whites. For example, black and Asian college freshmen estimate their parents' income to be lower than that of white students'.

RECENT PROGRESS IS MIXED

Once in college, women and minorities continue to participate in science and engineering (S&E) programs at lower rates than other groups. During the 1980s, however, the number of women earning baccalaureate degrees in science and engineering increased by 21 percent, while the number of comparable degrees earned by men declined by 1 percent. Women accounted for almost 40 percent of all S&E bachelor's degree recipients at the end of the decade; almost three-fourths of these women graduates received their degrees in the social sciences, life sciences, or psychology.

Despite the overall gains made by women, the number of degrees earned by women in some fields began to decline by the end of the decade, most notably in the earth, atmospheric and marine sciences and in the physical sciences, as well as in engineering.

At the end of the 1980s, blacks and Asians each accounted for close to 6 percent of all S&E bachelor's degrees conferred. These figures represented an increase in the number of degrees granted to Asians and a decrease in the number granted to blacks over the decade. Hispanics constituted 4 percent of the recipients of S&E bachelor's degrees in 1989, compared with 3 percent of the total a decade earlier. Native Americans accounted for less than one-half of one percent of the S&E baccalaureate degrees conferred at the end of the decade.

By far the most progress in integrating women and minorities into the S&E professions in recent years has occurred in the Nation's graduate schools. Over the past decade, the number of women enrolled in graduate S&E education increased two and one-half times as fast as the number of men (30 versus 13 percent). By 1990, women accounted for almost one-third of the students enrolled in S&E graduate programs. At the same time, Hispanics accounted for between 3 percent and 4 percent of the total, and blacks and Asians constituted 4 percent and 6 percent, respectively, of S&E graduate enrollment.

THE CHANGING ROLE OF WOMEN AND MINORITIES

During the 1980s, the number of master's degrees in science and engineering earned by women grew by 48 percent, while the number earned by men rose by only 12 percent. At the end of the decade, women received 42 percent of all master's degrees in science and 13 percent of all master's degrees in engineering, or a total of 31 percent of all S&E master's degrees awarded. In contrast, a decade earlier, women received only 26 percent of all S&E master's degrees. During the same decade, the number of S&E doctorates earned by women rose by 63 percent, compared with an increase of only 11 percent for men. As the decade ended, women accounted for 28 percent of all doctorates awarded in science and engineering, in contrast to 21 percent at the beginning of the decade. Eighteen percent of the doctorates awarded to women went to women who were not U.S. citizens, however. When citizenship is taken into account, American women account for 23 percent of all doctorates awarded at the end of the decade. Although the number of women doctorate holders increased in all fields of science and engineering during the 1980s, women's gains were most notable in computer science, where their number grew fivefold, and engineering, where their number quadrupled.

In 1990, blacks, Hispanics, and Asians accounted for over 2 percent, over 3 percent, and 22 percent, respectively, of all

S&E doctorates awarded by U.S. universities. When these figures are adjusted to include only U.S. citizens, however, the percentages of doctorates awarded to blacks, Hispanics, and Asians drops to less than 2 percent, less than 3 percent, and less than 4 percent, respectively. The substantial representation of non-U.S. citizens among minority doctorate recipients obscures the fact that minorities who are U.S. citizens have made only modest gains in achieving doctorates in science and engineering over the past decade. In fact, the number of black U.S. citizens annually receiving doctorates in science and engineering has declined in recent years.

The 1980s witnessed annual increases of 14 percent in the number of women in the ranks of employed scientists and engineers, in marked contrast to a 6-percent annual increase in the number of men entering the same professions. By the end of the decade, women accounted for 1 of every 3 scientists in the Nation, and 1 of every 25 engineers. The representation of women differed considerably by field of science, however, ranging from a low of about 1 of 10 environmental scientists to a high of about 1 of 2 psychologists.

Women scientists and engineers are more likely to be members of minority groups than are their male counterparts. At mid-decade, when this information was last collected, almost 5 percent of women scientists and engineers were black, whereas only about 2 percent of their male counterparts were black. Asian women were found at that time to be overrepresented among women scientists and engineers, compared with their presence in the general work force, by a factor of two; black and Hispanic women were half as likely to be in science and engineering as to be in the general work force.

Asian and Hispanics have patterns of participation in the S&E professions similar to whites while the pattern for blacks was different. For example, 56 percent of Asians, 54 percent of Hispanics and 52 percent of whites were engineers (as opposed to scientists) while 32 percent of blacks were engineers. Among scientists, blacks were more likely than either whites or Asians to be social scientists or psychologists. Hispanics were disproportionately represented in social science and underrepresented as computer specialists.

Because women and minorities have only recently begun to enter the scientific and engineering professions in sizable numbers, the majority of such professionals have fewer years of experience in their particular field than do men and nonminorities. For example, in 1989, approximately three-fifths of female Ph.D.'s employed in science and engineering, compared with one-third of their male colleagues, had fewer than 10 years of professional experience. Almost 50 percent of black Ph.D.'s employed in science and engineering had fewer than 10 years of professional experience, compared with 52 percent of Hispanic, 43 percent of Asian, and 34 percent of white doctoral scientists and engineers. The percentage of all doctoral scientists and engineers with fewer than 10 years' experience was 35 percent.

PROBLEMS REMAIN

Those women and minorities who do manage to acquire the education necessary to pursue careers in science and engineering occupy secondary roles in these professions in disproportionate numbers. For example, in 1989, when the median salary for employed doctoral scientists and engineers in the United States was $54,600, the median salary for women in this group was $9,800 lower. The median salaries for blacks and Hispanics were $6,100 and $4,500 lower, respectively. The median salary for Asians was slightly higher than $54,600. The relative "newcomer" status of women and minority scientists and engineers does not fully explain why members of these groups, with the exception of Asians, are paid less than other groups. In general, women and minority scientists and engineers receive notably lower salaries than do others with similar levels of experience and educational credentials.

Women and minority scientists and engineers, with the exception of Asians, are much more likely than others to be unemployed. The same is true for underemployment: women with doctorates are three times more likely than men with doctorates, and black doctorate holders are twice as likely as white doctorate holders, to hold part-time or non-S&E jobs. Scientists and engineers with disabilities (a group for which there are very limited data) are much less likely than those without disabilities to be in the labor force at any level of participation. Because employees who lack seniority and those who occupy part-time positions are normally the first to be cut during times of economic slowdown, women and minority scientists and engineers may be more adversely affected than others by the current recession.

introduction

The Science and Technology Equal Opportunities Act, passed in December 1980, calls for the National Science Foundation (NSF)

> ...to promote the full use of human resources in science and technology through a comprehensive and continuing program to increase substantially the contribution and advancement of women and minorities in scientific, professional, and technical careers, and for other purposes.[1]

Under this act, NSF is required to report to Congress on the status of women and minorities in science and engineering (S&E) professions on a biennial basis. This report is the sixth in the series, and, like its predecessors, it provides a comprehensive overview of the participation of women, minorities (including Hispanics), and persons with physical disabilities in S&E employment and training.

The report has been designed as a reference document that allows readers to easily locate information on particular subgroups or specific aspects of participation and utilization. The Status Update provides a concise overview; summary findings are presented in the introductory overviews of each chapter.

The body of the report is organized into three sections.

- Section 1, "Women," contains two chapters, which focus on women in science and engineering. Chapter 1 examines the representation and utilization of women—including members of racial and ethnic minority groups—in science and engineering. Chapter 2 addresses the acquisition of mathematics and scientific skills and highlights differences between the sexes in achievement test performance, academic preparation, and degree attainment.
- Section 2, "Minorities," also contains two chapters. Chapters 3 and 4 present information for minority groups similar to that presented in chapters 1 and 2 for women. This section addresses blacks, Asians, Native Americans, and Hispanics.
- Section 3, "Persons With Physical Disabilities," provides an overview of information about persons with physical disabilities who are in science and engineering.

The areas covered in chapters 1 and 3 relate to employment in science and engineering. They include the following:

- The representation of women and minorities in science and engineering employment.
- Differences in employment characteristics between sexes and across minority groups.
- The underutilization of women and minorities with science and engineering skills.

Labor market representation is assessed by comparing the proportion of employed scientists and engineers who are women and members of minority groups with the proportion of these groups in some relevant population—for example, the overall U.S. employed population or all professional and related workers. Level of representation, however, reveals nothing about the experiences of women and minorities once they are in the labor market. Thus, employment characteristics are included to describe women and minorities in the workforce.

Employment characteristics are analyzed in terms of field and career patterns. Information on field is valuable for at least two reasons:

- To indicate whether women and minorities are underrepresented in some fields vis-à-vis men and the majority.
- To reveal differences by sex and racial/ethnic group.

Employment opportunities vary by field; these differences may be significant in determining variations in work characteristics such as unemployment and salaries. Career patterns are also important because they may illuminate differences in experiences within fields. These patterns are measured in terms of proportion in management positions; for those employed in academia, tenure status and rank are used as indicators.

---

[1] "National Science Foundation Authorization and Science and Technology Equal Opportunities Act," Public Law 960516, 42 USC 1861 (December 12, 1980).

The third issue addressed in the employment chapters is the utilization of individuals with S&E training. Insights in this area may be gleaned from various labor market indicators; labor force participation and unemployment rates are standard measures. These rates are useful in assessing whether market conditions for women and minority scientists and engineers differ from those encountered by men and the majority and also by women and minorities in the general population.

Labor force participation rates measure the fraction of the S&E population in the labor force, that is, the proportion working or seeking employment. Low rates indicate that a significant fraction of those with S&E training and skills are not using these skills in science and engineering or in any other job.

A second indicator of utilization is unemployment. Unemployment rates measure the proportion of those in the labor force who are not employed but who are seeking employment. Higher rates for women and minorities may signify that these groups encounter labor market problems different from those of men and the majority in the S&E work force.

Unemployment rates, however, are incomplete market condition indicators for scientists and engineers. They do not indicate the degree to which those with the necessary education and training succeed in finding S&E jobs. The National Science Foundation has, therefore, developed the S&E underemployment rate. This rate indicates the extent to which scientists and engineers use their training and skills. For example, when full-time jobs are not available, individuals may accept part-time jobs. Similarly, when S&E jobs are not available, some individuals accept jobs in other areas. Thus, some part-time employment (i.e., part-time employment of those seeking full-time jobs) and some non-S&E employment (i.e., employment signifying a belief that S&E jobs are not available) may indicate underemployment. The underemployment rate provides an overall statistical measure of both involuntary part-time and involuntary non-S&E employment.

Observed differences in labor market experiences between women and men and between minorities and the majority highlight possible areas of concern. Although disparities may indicate inequitable treatment, they are not in themselves enough to justify such an inference. Differences may reflect such factors as (1) field and work experience; (2) workers' decisions about the nature of their work involvement; (3) employers' personnel practices in areas such as hiring, training, and promotion; or (4) a combination of these factors that includes, or is a by-product of, inequitable treatment.

The primary source of information about the characteristics of scientists and engineers in the United States is the National Science Foundation's Scientific and Technical Personnel Data System (STPDS). This system consists of three major components, each designed to measure a particular subpopulation:

1. The Experienced Sample of Scientists and Engineers is a biennial follow-up survey to the *1982 Postcensal Survey of Scientists and Engineers*. The *Postcensal Survey* sample was drawn from those individuals who were in the S&E population at the time of the 1980 census. The most recent survey in this series was conducted in 1989. However, questions about the validity of these data have led to delay in their publication, pending further evaluation.
2. *The Survey of Recent Science and Engineering Graduates* surveys scientists and engineers who earned S&E degrees after the 1980 decennial census was completed. The most recent survey, conducted in 1990, focused on the graduating classes of 1988 and 1989.
3. *The Survey of Doctorate Recipients* is a survey of scientists and engineers who have received their doctorates since 1942. The most recent survey in this series was conducted in 1989.

To produce national estimates, data from the Experienced Sample and *Recent Graduates* surveys are integrated with a computer-based model, the Science and Engineering Tabulating Model (SETAB). Due to the above noted problem with the *1989 Experienced Sample Survey*, the last published national estimates on the population of employed scientists and engineers generated with the SETAB were in 1988. This report accordingly uses the 1988 estimates and 1986 characteristics of the population of employed scientists and engineers, both which were used in the last edition of this report.

Data from the 1989 survey of doctoral scientists and engineers and the 1990 survey of recent college graduates are also presented. In addition, Bureau of Labor Statistics (BLS) figures on employed civilians for 1990 will be used when possible. However, it should be noted that BLS and SETAB figures are not directly comparable, because the former are based on an individual's being employed in a specific occupation, regardless of training. The SETAB required that the individual meet at least two of the following criteria: (1) have a degree in science or engineering, (2) be employed in a science or engineering occupation, or (3) have professional identification as a scientist or engineer, on the basis of education and experience.

Chapters 2 and 4 of this report focus on issues related to education and training, specifically the acquisition of those skills requisite to an S&E career. These issues are of increasing importance for several reasons. The population's changing demographic mix results in a rate of influx for minorities at all educational levels that is higher than that for whites. As a group, however, minorities do not participate in S&E undergraduate and graduate training to the same extent as do the majority. It is therefore critical to ensure that they have the same opportunities for and access to the (1) acquisition of skills in mathematics and science, and (2) training necessary to meet the nation's need for highly trained S&E personnel.

The education and training chapters explore differences between women and men and between minorities and the majority in four areas of education and training:

- Precollege preparation.
- Undergraduate education.
- Graduate education.
- Postdoctoral experiences.

Most of the data presented in these chapters are from sources outside the NSF. Because these data are not consistently based on regularly recurring surveys, the information that has been presented in previous reports is not always available. Alternative information sources have been substituted where possible.

Scores on standardized tests measuring mathematics and science achievement are used as indicators of participation patterns. For example, students who take fewer years of coursework in mathematics generally score lower on exams measuring mathematical knowledge. Scores on these exams reflect a variety of factors, including social, demographic, and economic characteristics. There is, for instance, evidence linking student performance on standardized tests to family income, and a disproportionate number of minority families are at lower economic levels.

The appendixes of this report contain technical notes (appendix A) and statistical tables (appendix B). The technical notes present information on the underlying concepts, data collection techniques, reporting procedures, and statistical reliability of the primary NSF data sources used in this report.

SECTION I

Women

chapter 1

women in science and engineering

Overview 3
Employment Levels and Trends 4
Field 4
Experience 7
Career Patterns 7
  Management 7
  Tenure Status and Academic Rank 7
Labor Market Indicators 8
  Labor Force Participation Rates 8
  Unemployment Rates 8
  S&E Underemployment Rates 10
  Salaries 10
Minority Women 12
  Racial Minorities 12
  Hispanics 13

chapter 2

education and training of women in science and engineering

Overview 15
Precollege Preparation 15
  Mathematics and Science Achievement 15
  Characteristics of College-Bound Seniors . . . 17
Undergraduate Education 20
  Characteristics of American Freshmen 20
  Graduate Record Examination 21
  Bachelor's Degree Production 22
Graduate Education 23
  Graduate Enrollment 23
  Graduate Degree Attainment Rates 24
  Advanced Degree Production 24
  Graduate Support Status 25
  National Science Foundation Fellowships . . . 25
Postdoctoral Appointments 26

chapter 1

women in science and engineering

DATA IN THIS EDITION

Because no new estimates of the population of employed scientists and engineers are available, the figures for 1988 that were published in the 1990 edition are repeated here. Where appropriate, figures for 1986 are used to provide a general context for reporting information from two new sources: the 1989 survey of doctoral scientists and engineers and the 1990 survey of recent college graduates. In addition, Bureau of Labor Statistics figures on employed civilians for 1990 are used where possible.

OVERVIEW

An estimated 868,000 women scientists and engineers were employed in the United States in 1988, representing 16 percent of all employed scientists and engineers. However, women were grossly underrepresented in the population of employed scientists and engineers compared with their employment level in the overall U.S. work force. In 1988 they constituted about 45 percent of all workers. Women were more underrepresented among engineers than among scientists; they constituted 4 percent of all engineers and 30 percent of scientists in 1988.

Bureau of Labor Statistics (BLS) figures, which are estimates of the numbers of individuals employed in specific occupations, indicate that in 1990 women still constituted 45 percent of all civilian workers.[1] Women were also underrepresented among those employed as engineers (8 percent), mathematical and computer scientists (36 percent), natural scientists in general (26 percent), and certain categories of natural scientists—biological and life scientists (41 percent), chemists (27 percent), and geologists and geodesists (14 percent). Women were employed as social scientists and urban planners (51 percent) in numbers disproportionate to their numbers in the overall work force.[2] Thus, BLS statistics show the same employment pattern by occupation in 1990 as existed in 1988. Women are underrepresented in science and engineering (S&E) occupations but are more underrepresented among engineers than among scientists (except among social scientists, where they are overrepresented).

Women scientists and engineers are more likely than their male colleagues to be unemployed and underemployed. The unemployment rate for women in S&E fields in 1986 was 2.7 percent, versus 1.3 percent for men. These rates were half the 1976 rates, which were 5.4 percent (women) and 3.2 percent (men). Although the 1986 unemployment rate for women scientists and engineers was well below that for all women in the United States (7.1 percent), it was comparable to the rate for all women college graduates (2.4 percent).

Even though the unemployment rates of women with doctorates and master's degrees in S&E fields are low, they are higher than those of men in these fields. In 1989, women Ph.D's had an unemployment rate of 1.7 percent, which was almost three times the 0.6 percent rate for men. Women who received their master's degrees in S&E fields in 1988 and 1989 had an unemployment rate of 2.7 percent in 1990, versus 1.5 percent for men. However, during the same period, women who received baccalaureate degrees in science and engineering had an unemployment rate of 3.3 percent, which was slightly lower than the 3.5 percent rate for men.

Women scientists and engineers were three times as likely as men (6.3 percent versus 1.9 percent) to report being underemployed in 1986. Women with doctorates were also more likely to be underemployed than were their male counterparts. In 1989, their underemployment rate was 2.6 percent; in comparison, the rate for men was 1.0 percent. Overall, these are very low rates.

Women also reported relatively low annual salaries. In 1989, women with doctorates in S&E fields and one year or less of professional experience had a median annual salary of $35,500, which was 88 percent of that of men ($40,400). Among recent master's and bachelor's degree recipients in 1990, women also had lower salaries than men. 1988 and 1989 female graduates with S&E master's degrees had a salary of $32,000, equal to 84 percent of the median salary of male graduates ($39,000). The yearly median earnings of 1988 and 1989 female graduates who received baccalaureate degrees in science and engineering ($21,600) were 73 percent of the earnings of men with comparable degrees ($29,500).

Because of the recent influx of women into science and engineering professions, these women are generally younger and have fewer years of professional experience than men. Almost 60 percent of women, compared with approximately 26 percent of men, reported fewer than 10 years of professional work experience in 1986. In 1989, about 57 percent of women with doctorate degrees had fewer than 10 years of professional experience; in comparison, 30 percent of the men with doctorates had fewer than 10 years' experience. Only 9 percent of the women, but 31 percent of the men, had 20 years of experience or more.

---

[1] U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, vol. 38, no. 1 (Washington, DC: U.S. Government Printing Office, January 1991), table 22, p. 185.

[2] Employment and Earnings, vol. 38, p. 185.

Relatively few women scientists and engineers are members of minority groups. In 1986, about 5 percent were black, another 5 percent were Asian, and less than 1 percent were Native American. Among men in science and engineering, about 2 percent were black, 5 percent were Asian, and less than 1 percent were Native American. Hispanic women accounted for only a small fraction (3 percent) of all women scientists and engineers; Hispanic men, however, accounted for only 2 percent of all men scientists and engineers. Only Asian women were more highly represented among women scientists and engineers than in the overall work force.

EMPLOYMENT LEVELS AND TRENDS

In 1988, women constituted 16 percent of the science and engineering (S&E) work force (867,900 out of 5,286,400) (appendix B, table 1). Thus, they represented a smaller proportion of the science and engineering work force than they did of the total U.S. work force. This is also true for employment in professional and related occupations. In 1990, women represented 45 percent of all employed persons[3] and 51 percent of those employed in professional specialty occupations,[4] but only 8 percent of persons employed as engineers.[5] Women's representation among scientists employed in selected fields, although not equal to their representation in the total work force, was much higher. For example, in 1990 women represented 26 percent of persons employed as natural scientists and 36 percent of those employed as mathematical and computer scientists.[6] Furthermore, within the natural sciences, 41 percent of biological and life scientists, 27 percent of chemists, and 14 percent of geologists and geodesists were women. Female urban planners and social scientists, at 51 percent of the total employed in these fields, were overrepresented in relation to their representation in the overall civilian work force.

Women have increased their representation in both the overall work force and the S&E work force over the most recent 10-year period for which data are available. In 1980, women represented 42 percent of the civilian work force; in 1990 this figure was 45 percent.[7] In addition, although women's representation in the S&E work force is still relatively low (16 percent in 1988), it has been increasing: in 1978, only 9 percent of scientists and engineers were women (based on appendix B, table 1).

Women's expanding S&E representation derives from an employment growth rate that substantially exceeded that of men over the last decade. Between 1978 and 1988, the employment of women scientists and engineers rose by 259 percent (14 percent per year) compared with an 87-percent increase for men (6 percent per year) (based on appendix B, table 1).[8]

There has also been substantial growth in the number of women doctoral scientists and engineers who are employed.[9] Figures for 1979 and 1989 show that employment of these women grew by 131 percent (9 percent per year), compared with 32 percent (3 percent annually) for men (based on appendix B, table 3). In 1989, there were approximately 77,000 employed women doctoral scientists and engineers. This number represented 17 percent of the total work force with Ph.D.'s, up from 11 percent (33,400) in 1979.

The number of science and engineering baccalaureate degrees awarded to women[10] increased by 21 percent during 1979-1986 and remained level thereafter, while the number awarded to males rose 8 percent during 1979-1985 then fell 9 percent during 1986-89 (based on appendix B, tables 39 and 40). The number of master's degrees earned by women in 1989 was 48 percent higher than the number received a decade earlier (based on appendix B, table 50). Meanwhile, the number of S&E master's degrees earned by men increased by only 12 percent between 1979 and 1989 (based on appendix B, table 49). Consequently, women accounted for a relatively higher proportion of employed recent science and engineering graduates. In 1990, about 38 percent of employed graduates who were granted an S&E baccalaureate and 29 percent who earned master's degrees in 1988 or 1989 were women (based on appendix B; table 5).[11]

FIELD[12]

Women represent a much larger proportion of employees in the scientific fields than in engineering (chart 1-1).[13] In 1988, when almost 30 percent of scientists were women, only 4 percent of engineers were women. Among science fields, the

---

[3] Council of Economic Advisers, Economic Report of the President, 1990 (Washington, DC: U.S. Government Printing Office, February 1991); calculation based on figures in table B-33, p. 324.

[4] Employment and Earnings, vol. 38, p. 185. This classification includes nine broad categories of professional occupations: engineering, mathematical and computer science, natural science, health diagnosis, health assessment and treatment, teaching (all educational levels), law, judicial, and other professional specialties.

[5] Employment and Earnings, vol. 38, p. 185.

[6] Employment and Earnings, vol. 38, p. 185.

[7] Economic Report of the President, 1990, p. 324.

[8] National Science Foundation, Women and Minorities in Science and Engineering, NSF 90-301, January 1990, p. 3.

[9] Data on the characteristics of doctoral scientists and engineers in the United States are from the National Science Foundation's Survey of Doctorate Recipients. This survey has been conducted biennially in odd-numbered years since 1973. The most recent survey was conducted in 1989.

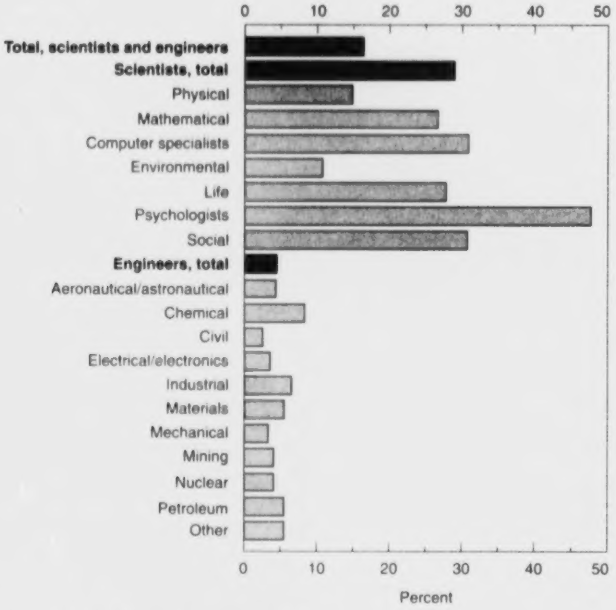
[10] See chapter 2, "Education and Training of Women in Science and Engineering," for a discussion of trends in S&E degree production among men and women.

[11] Data are from the National Science Foundation's 1990 Survey of Recent Science and Engineering Graduates, which includes cohorts 1 year and 2 years after graduation. The most recent cohorts were 1988 and 1989.

[12] Information on total scientists and engineers was excerpted from Women and Minorities, pp. 4-5.

[13] See appendix A, "Technical Notes," for National Science Foundation S&E field definitions.

Chart 1-1. Women as a percentage of employed scientists and engineers, by field: 1988



SOURCE: Based on appendix B, table 1

representation of women ranged from 11 percent of environmental scientists to 48 percent of psychologists. In engineering, the range was from 3 percent of both mechanical and civil engineers to 8 percent of chemical engineers.

Representation in S&E fields differed dramatically for women and men (table 1-1). Almost half of all women scientists and engineers were concentrated in psychology or the life and social sciences. A majority of men, on the other hand, were engineers.

Table 1-1. Employed scientists and engineers, by field and sex: 1988 [Percentages]

Field	Females (N = 867,900)	Males (N = 4,417,400)
Scientists, total	86	41
Physical	5	6
Mathematical	5	3
Computer specialists	25	11
Environmental	1	2
Life	15	8
Psychologists	15	3
Social	19	8
Engineers, total	14	59
Aeronautical/astronautical	1	3
Chemical	1	3
Civil	1	8
Electrical/electronics	3	14
Industrial	1	4
Materials	--	1
Mechanical	2	11
Mining	--	1
Nuclear	--	1
Petroleum	--	1
Other	4	14

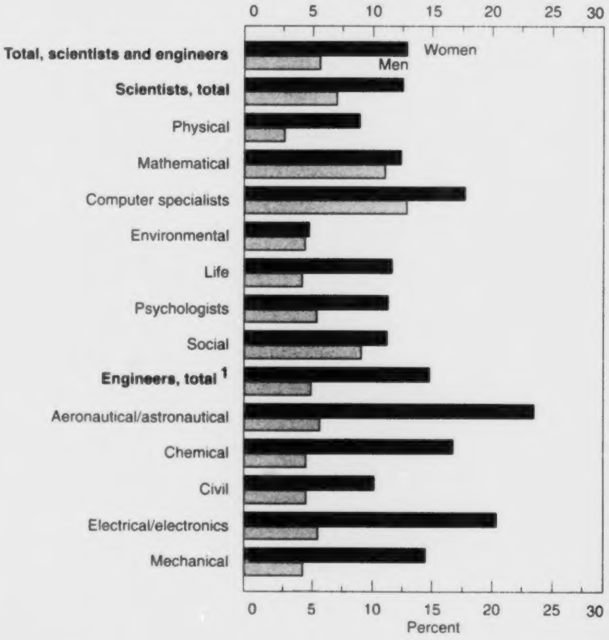
N=estimated population; double dashes (—) represent too few cases to estimate
NOTE: Detail may not add to total because of rounding.
SOURCE: Based on appendix B, table 1

These field differences between men and women have changed somewhat since 1978, owing to differing growth patterns in the fields themselves (chart 1-2). The fastest growing science field for both women and men was computer specialties, up 19 percent and 14 percent annually, respectively. In 1988, approximately 25 percent of women and 11 percent of men employed in science and engineering fields were computer specialists, compared with 17 percent and 6 percent, respectively, in 1978. The number of female engineers grew at an annual rate of 16 percent between 1978 and 1988; the number of male engineers increased at an annual rate of 6 percent. In 1988, approximately 14 percent of females employed in S&E fields were engineers, up from 12 percent in 1978. The proportion of males employed in S&E fields dropped from 64 percent in 1978 to 59 percent in 1988.

For both women and men, the fastest growing subfield over the decade was aeronautical/astronautical engineering. Above-average employment increases (16 percent annually) were also registered for women in electrical/electronics and mechanical engineering.

The field distribution differences between women and men scientists and engineers may be summarized by using the

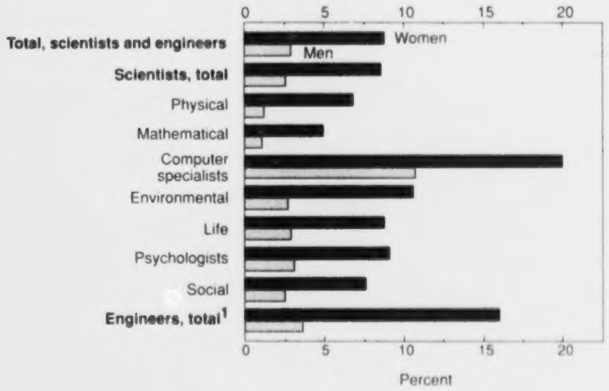
Chart 1-2. Average annual employment growth rates of scientists and engineers, by field and sex: 1978-88



[1] No additional engineering subfields are available for 1978.
SOURCE: Based on appendix B, table 1

index of dissimilarity.[14] In 1988, the index was 47, signifying that 47 percent of women would have to change fields to have a distribution identical to that of men. If the science and engineering work forces are considered separately, the index is 24 in the science work force and 23 in engineering. Since 1978, these indexes have not changed substantially.

Chart 1-3. Average annual employment growth rates of doctoral scientists and engineers, by field and sex: 1979-89



[1] Because the number of doctoral women engineers is small (1,790), growth rates for engineering subfields are not presented.
SOURCE: Based on appendix B, table 3

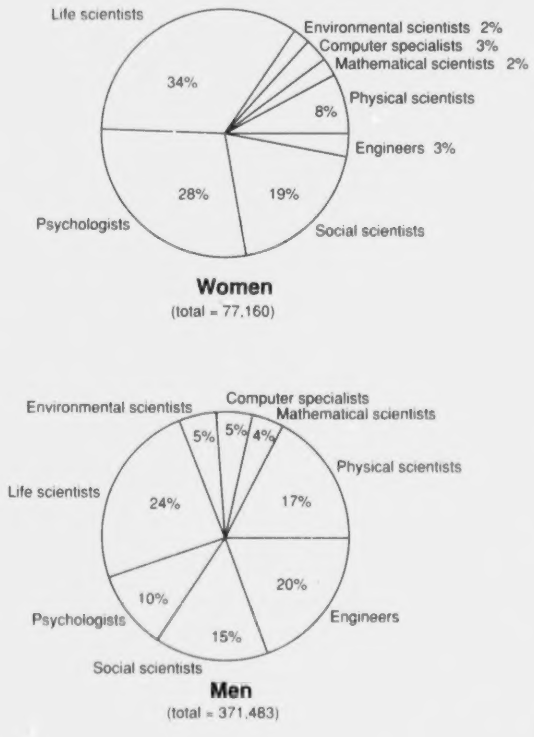
Among doctoral scientists and engineers, growth rates for women and men have also varied considerably by field (chart 1-3). Employment of women Ph.D.'s in the sciences rose at an annual rate of 9 percent between 1979 and 1989, compared with 3 percent for men. The most rapid growth for women occurred in those fields where the number of employed women was relatively low in 1979. For example, the number of women doctoral computer specialists rose from about 370 in 1979 to 2,300 in 1989 (an average annual growth rate of 20 percent), and the number of women doctoral engineers rose from about 500 to 2,300 (an average of 16 percent per year).

The above-average growth rates in these two fields mirrored trends in degree production. The number of doctorates granted to women in engineering in 1989 (373) was 502 percent higher than the number granted in 1979 (62) (based on appendix B; table 54). This rate of increase in female Ph.D.'s in engineering was much greater than the increase in all of the major science fields. The major science fields (and their rates of growth) include computer science (296 percent), physical sciences (111 percent); mathematics (31 percent); earth, atmospheric, and oceanographic sciences (151 percent); agricultural and biological sciences (71 percent); psychology (43 percent); and social sciences (25 percent).

Employed women and men scientists and engineers with doctorates have widely different distributions by field (chart 1-4). Of these Ph.D.'s, more women (97 percent) than men (80 percent) were scientists in 1989. Over 80 percent of women Ph.D.'s were life scientists (34 percent), psychologists (28 percent), or social scientists (19 percent). Men with doctorates were concentrated in the life sciences (24 percent), engineering (20 percent), and physical sciences (17 percent). Within engineering, women were most likely to be electrical/electronics engineers (19 percent) in 1989; this was also true for men (20 percent).

Not surprisingly, the index of dissimilarity for doctoral scientists and engineers was 32 in 1989—24 for scientists and

Chart 1-4. Employed doctoral scientists and engineers, by field and sex: 1989



SOURCE: Based on appendix B, table 3

---

[14] U.S. Commission on Civil Rights, Social Indicators of Equality for Minorities and Women (Washington, DC: U.S. Government Printing Office, August 1978), p. 44. The index of dissimilarity is calculated by taking the difference between two percentage distributions (one for each group, and each totaling 100 percent) covering the same occupation. The sum of the absolute (disregarding the sign) difference for all occupations is divided by two and the result is the index of dissimilarity. "The index ... represents the percentage of a group who would have to change occupations in order for the group to have the identical distribution of a comparison group. If two groups had the same distribution of occupations, the index of dissimilarity would be 0.0"

only 8 for engineers. The index has not changed much over the decade. In 1979 it was 33—25 for scientists and 8 for engineers.

EXPERIENCE

Employment of women scientists and engineers increased relatively more rapidly over the decade from 1978 to 1988 than did the employment of men. Thus women scientists and engineers, on average, are younger and have fewer years of professional experience than their male colleagues. In 1986, almost 60 percent of women scientists and engineers—compared with slightly more than 25 percent of men—had fewer than 10 years of professional experience. Only 15 percent of women, but 46 percent of men scientists and engineers, had 20 or more years of work experience (based on appendix B, tables 7 and 8).[15]

Years of work experience for women vary among S&E fields. For example, in engineering—a field that has seen a considerable increase in the employment of women—almost 68 percent of women had fewer than 10 years of professional work experience in 1986. In science fields overall, about 56 percent of women reported fewer than 10 years of work experience.[16]

Doctoral women scientists and engineers also have less work experience than do doctoral men (chart 1-5). In 1989, the proportion of women with fewer than 10 years of work experience since receiving their doctorates was 57 percent, versus 30 percent for men. The proportion of doctoral scientists and engineers with 20 years or more of professional experience was 9 percent for women and 31 percent for men (based on appendix B, tables 10 and 11).

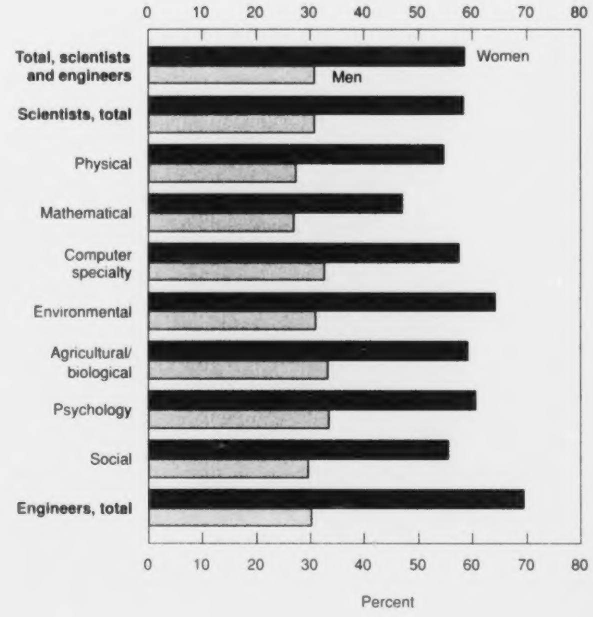
CAREER PATTERNS

Because there are no direct measures of career development for scientists and engineers, indirect measures are substituted. One such indicator is the proportion of scientists and engineers in management—especially management of research and development activities. Because no more recent data are available, findings from 1986 will be highlighted, supplemented by information on the tenure status and faculty rank of doctoral scientists and engineers in academia.

Management[17]

Of scientists and engineers reporting a major work activity, 19 percent of women—compared with 29 percent of men—reported management (general and of R&D) as their major work activity. Among engineers, 13 percent of women and 31 percent of men reported that they were engaged in management activities. Within the engineering subfields, the proportions of women reporting management as their primary work activity ranged from 6 percent of petroleum engineers to 17 percent of industrial engineers. The range for men was from 21 percent of petroleum engineers to 37 percent of civil engineers.

Chart 1-5. Percentages of doctoral women and men with fewer than 10 years of work experience, by field: 1989



SOURCE: Based on appendix B, tables 10 and 11

Among scientists, 20 percent of women, compared with 27 percent of men, reported management as their primary work activity. This difference was small in some fields. For example, about 33 percent of women social scientists—compared with 37 percent of men—reported management as their major work.

Tenure Status and Academic Rank

Among doctorate-level scientists and engineers employed in 4-year colleges and universities, women are less likely than men to be tenured or to hold full professorships (table 1-2). In 1989, about 36 percent of women Ph.D.'s were tenured, compared with 59 percent of men Ph.D.'s. However, the younger age and fewer years of professional experience accounts for some of this difference. In 1989, 39 percent of employed female doctoral S&E were under 40 years old; 25 percent of the men were in the same age category.[18]

---

[15] Women and Minorities, p. 6.

[16] Women and Minorities, p. 6.

[17] See Women and Minorities, pp. 6-7, for additional details on this topic. Figures are based on Appendix B: tables 13-15.

In 1989, a smaller proportion of doctoral women (70 percent) than men (84 percent) held professorial rank (i.e., full, associate, or assistant professor) in 4-year colleges and universities. Among those with professorial rank, women were much less likely than men to hold full professorships and more likely to hold assistant professorships. Since 1979, however, progress has been made by women. The number of women Ph.D.'s who were full professors in 1989 (7,348) was 185 percent higher than the number in 1979 (2,576); the increase for men was 73 percent (from 47,791 in 1979 to 82,857 in 1989).[19]

Table 1-2. Doctoral scientists and engineers in 4-year colleges and universities, by tenure status, academic rank, and sex: 1989 [Percentages]

Tenure status and academic rank	Females	Males
Tenure status	(N = 39,864)	(N = 181,078)
Tenure track	58	73
Tenured	36	59
Not tenured	21	14
Non-tenure track	17	8
Other and no report	26	19
Academic rank	(N = 39,864)	(N = 181,078)
Full professor	18	46
Associate professor	24	23
Assistant Professor	28	15
Other and no report	29	17

N = estimated population
NOTE: Detail may not add to total because of rounding
SOURCE: Based on appendix B, tables 16, 17, 19, and 20

LABOR MARKET INDICATORS

Labor market indicators[20] such as salaries and unemployment rates are useful in assessing the relative success which women and minorities have achieved in the labor market. However, the existence of disparities between groups does not prove or disprove the existence of discrimination in the labor market. Differences in salaries and various measures of employment status may reflect inequitable treatment; or a number of factors including field distributions, experience levels, employment sectors, labor market behavior; or a combination of both.

Labor Force Participation Rates[21]

The labor force participation rates for men and women scientists and engineers were approximately equal (95 percent and 94 percent, respectively) in 1986 (appendix B, table 21). These rates were higher than those for both the population in general and the college-educated population in particular. In 1986, about 55 percent of all women age 16 or older and 76 percent of men were in the labor force. For college-educated individuals, the corresponding rates were 73 percent and 88 percent, respectively.[22]

BLS figures show similar overall labor force participation rates in 1990. For example, about 58 percent of all women age 16 or older and 76 percent of all men were in the labor force.[23] College-educated women had a 75-percent participation rate and college-educated men an 88-percent rate.[24]

Labor force participation rates varied for women among S&E fields in 1986. Within science fields, rates for women ranged from 90 percent of life scientists to 97 percent of computer specialists; in engineering, the range was from 90 percent of chemical and electrical/electronics engineers to 99 percent of aeronautical/astronautical engineers. However, the overall rate for women scientists was the same as that for women engineers—94 percent.

Women and men scientists and engineers (who received their Ph.D.'s between 1946 and 1988) participated in the labor force at the same rate (93 percent) in 1989 (appendix B, table 22). Both sexes had participation rates of about 93 percent in science fields. However, within science fields, rates for women ranged from 89 percent for physical scientists to 99 percent for computer specialists. Similarly, men's rates ranged from 91 percent for physical scientists to 99 percent for computer scientists. Rates for doctoral engineers were slightly higher for women (98 percent) than men (96 percent).

Among recent college graduates, women with bachelor's degrees in science fields participated in the labor force to a lesser degree (96 percent) than did men (98 percent) (appendix B, table 23). This was true of graduates with degrees in all science fields except the social sciences and environmental sciences, in which the rates were about the same. Rates for graduates with degrees in engineering were 98 percent for women and 99 percent for men.

Recent female graduates with master's degrees in science fields also participated in the labor force at a lower rate than males (94 percent versus 99 percent). For women, rates ranged from 89 percent in the social sciences to 100 percent in the environmental sciences; rates for men ranged from 98 percent in the social and life sciences to 100 percent in psychology and the environmental sciences. Of those with master's degrees in engineering, 93 percent of women and 98 percent of men were in the labor force.

---

[18] National Science Foundation, Characteristics of Doctoral Scientists and Engineers in the United States: 1989, NSF 91-317, table 31, p. 36.

[19] Figures for 1989 are from appendix B, tables 19 and 20; figures for 1979 are from National Science Foundation, Characteristics of Doctoral Scientists and Engineers in the United States: 1979, NSF 80-323, p. 7.

[20] See appendix A, "Technical Notes," for definitions of the labor market rates used in this report.

[21] Information for all scientists and engineers is excerpted from Women and Minorities, p. 8.

[22] Data on labor force participation rates for the general population are from Employment and Earnings, p. 157. Rates for the college-educated population are from the U.S. Department of Labor, Bureau of Labor Statistics, unpublished tabulations.

[23] Employment and Earnings, vol. 38, p. 164.

[24] U.S. Department of Labor, Bureau of Labor Statistics, unpublished tabulations.

Women and men scientists and engineers who do not participate in the labor force differ in their reasons for nonparticipation. In 1986,[25] about 34 percent of women who were nonparticipants in the labor force reported family responsibilities ("keeping house") as their primary reason; less than 1 percent of men gave this reason. Women also were more likely than men to report that they were outside the labor force because they were students ("going to school") (35 percent versus 15 percent). On the other hand, over 75 percent of men—and fewer than 15 percent of women—said that they were retired.

The reasons given for nonparticipation were different for women scientists and engineers than for all women. In 1986, about 67 percent of all women cited family responsibilities, 14 percent were retired, and 8 percent were students.[26]

Similarly, BLS statistics for 1990 show that 55 percent of all women cited family responsibilities as their reason for not participating in the labor force.[27] Eighteen percent gave retirement as their reason for not being in the labor force, and 8 percent were students. Of men nonparticipants, 52 percent cited retirement; 15 percent, student status; 12 percent, disability; and 2 percent, family responsibilities.

Unemployment Rates[28]

Although women and men scientists and engineers participate in the labor force at approximately the same rate, women have a higher unemployment rate than do men. In 1986, the rate for women was more than twice that for men—2.7 percent versus 1.3 percent (appendix B, table 21). Unemployment rates, however, had fallen for both women and men over the decade since 1976, when the rates were 5.4 percent and 3.2 percent, respectively.

The 1986 unemployment rate for women scientists and engineers was considerably lower than the rate for all women in the United States (7.1 percent),[29] but was comparable to both the rate for women in professional occupations (2.3 percent)[30] and the rate for women college graduates (2.4 percent).[31]

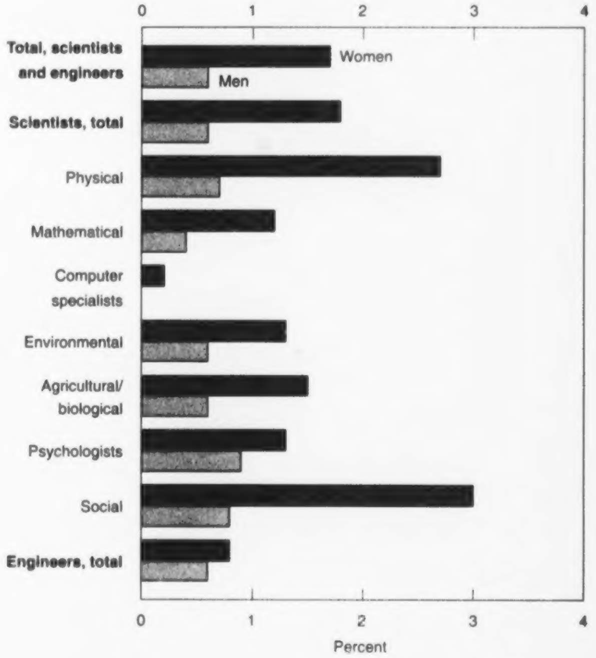
Unemployment rates by sex vary both between and within science and engineering fields. In all science fields, unemployment rates for women were higher than those for men in 1986. The largest difference was between women and men environmental scientists (8.2 percent versus 3.9 percent). At the other extreme, unemployment rates for women (2.7 percent) and men (2.3 percent) social scientists were quite similar (appendix B, table 21). The lowest rates for both women and men were reported by computer specialists in 1986 (1.6 percent and 0.6 percent, respectively).

Within engineering fields, with one exception, unemployment rates for women were higher than those for men. In 1986, the unemployment rate for women electrical/electronics engineers (1 percent) was approximately equal to that for men.

The unemployment rates of doctoral scientists and engineers, both women and men, are lower than those of all scientists and engineers. However, rates for doctoral women were higher than those of their male colleagues in all S&E fields. In 1989, the unemployment rate for women with doctorates (1.7 percent) was almost three times that for men (0.6 percent) (chart 1-6a).

Between 1979 and 1989, the unemployment rate declined from 2.4 percent to 1.7 percent for doctoral women, but remained essentially the same for men (0.7 percent in 1979 and 0.6 percent in 1989). In 1989, within fields, women with doctorates had consistently higher unemployment rates than did men with doctorates (chart 1-6a).

Chart 1-6a. Unemployment rates of doctoral scientists and engineers, by sex and field: 1989



SOURCE: Appendix B, table 22

---

[25] Findings for 1986 are from Women and Minorities, p. 8.

[26] U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, vol. 34, no. 1 (Washington, DC: U.S. Government Printing Office, January 1987), p. 197.

[27] Employment and Earnings, vol. 38, p. 204.

[28] Information on 1986 rates is from Women and Minorities, p. 8.

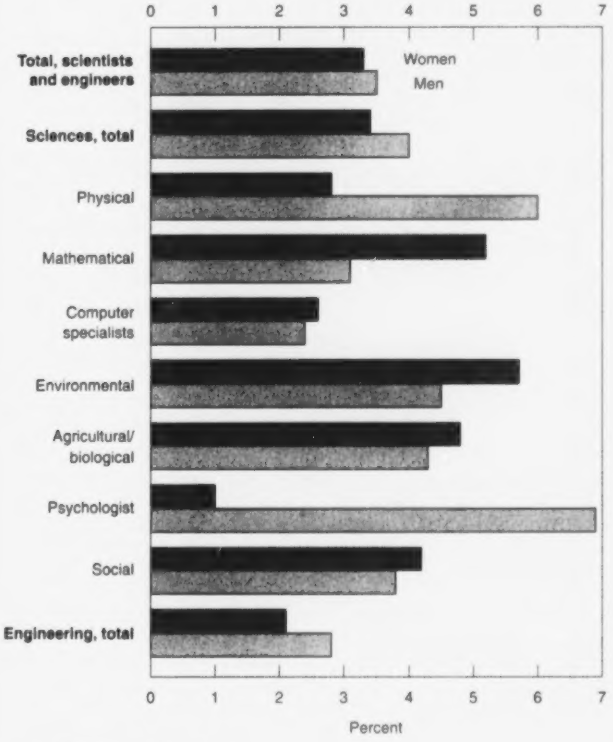
[29] Employment and Earnings, vol. 34, p. 168.

[30] Employment and Earnings, vol. 34, p. 168.

[31] U.S. Department of Labor, Bureau of Labor Statistics, unpublished tabulations.

Unemployment rates for recent recipients of S&E degrees are similar for women and men at the baccalaureate level, but are much higher for women at the master's degree level. For those who obtained their bachelor's degrees in 1988 or 1989, unemployment rates in 1990 were 3.5 percent for men and 3.3 percent for women (chart 1-6b). Also, unemployment rates for women were lower than those for men in psychology, physical sciences, and engineering.[32] For recent S&E master's degree recipients, the rate for women (2.7 percent) was higher than that for men (1.5 percent) (chart 1-6c).

Chart 1-6b. Unemployment rates of S&E bachelor's recipients, by sex and field: 1990

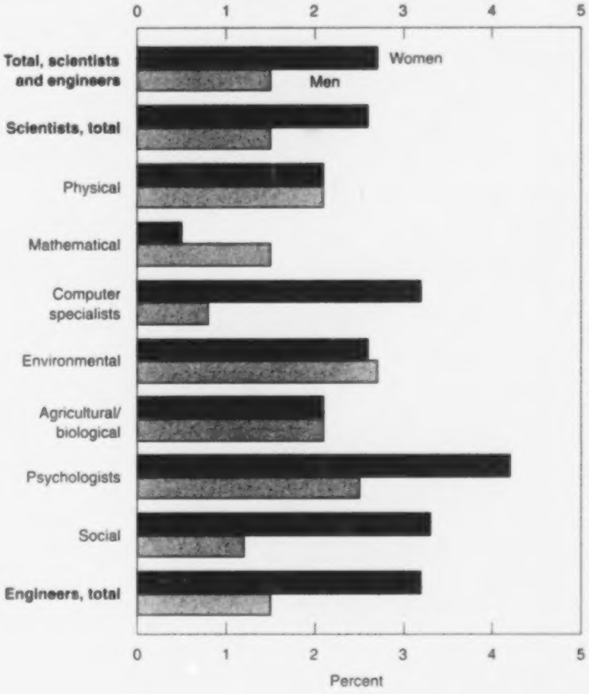


SOURCE: Appendix B; table 23

S&E Underemployment Rates[33]

The S&E underemployment rate is one measure of underutilization among employed scientists and engineers.[34] For women scientists and engineers, this rate was approximately three times that for men in 1986 (6.3 percent versus 1.9 percent) (appendix B, table 21). The rates were higher for women in almost all major fields of science and engineering.

Chart 1-6c. Unemployment rates of S&E master's recipients, by sex and field: 1990



SOURCE: Appendix B, table 23

The greatest differences occurred in science fields, in which the underemployment rate was 7.0 percent for women and 3.3 percent for men. Only among computer specialties did women and men report the same rate—2.5 percent. In engineering, women had an underemployment rate of 2.3 percent, compared with 1.0 percent for men.

Although S&E underemployment rates among doctoral scientists and engineers were lower than those for all scientists and engineers, the rate for women was still higher than that for men (chart 1-7). In 1989, these rates were 2.6 percent for women and 1.0 percent for men. Among women, underemployment rates were higher for scientists (2.7 percent) than for engineers (1.0 percent). The rates for men were 1.1 percent for scientists and 0.5 percent for engineers. By field, underemployment was highest for social scientists for both women (5.2 percent) and men (2.1 percent) (appendix B, table 22).

Salaries

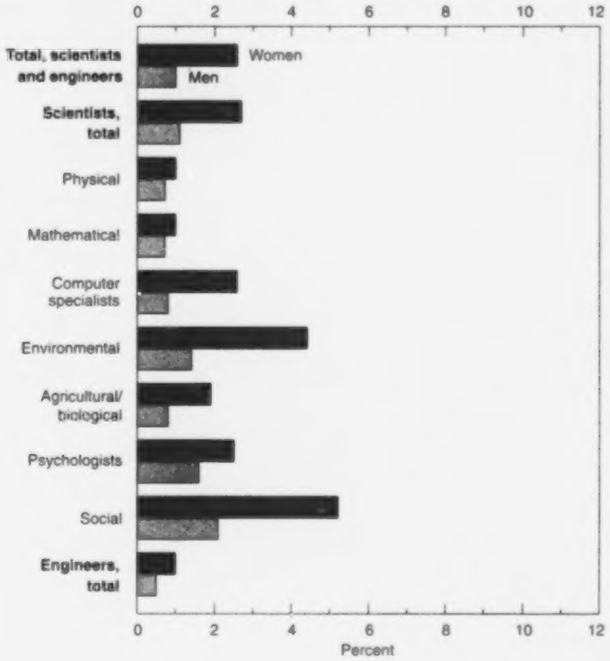
Average annual salaries of women scientists and engineers are lower than those of men. This difference may stem from differences in degree fields, degree levels, experience levels, employment sectors, labor market behavior, or a combination of these variables.

---

[32] National Science Foundation, Science Resources Studies Division, Characteristics of Recent Science and Engineering Graduates: 1990 (forthcoming, 1992).

[33] Information for 1986 is excerpted from Women and Minorities, p. 7.

Chart 1-7. Underemployment rates of doctoral scientists and engineers, by sex and field: 1989



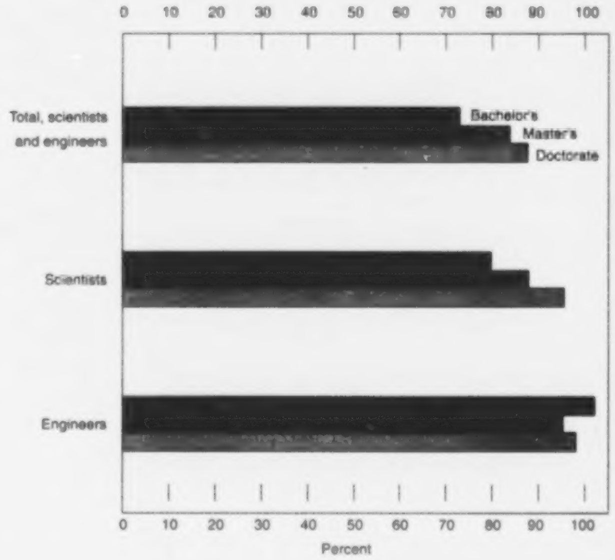
SOURCE: Based on appendix B, table 22

In 1986, the average annual salaries of women scientists and engineers were about 75 percent of men's salaries.[35] In 1990, the median annual salary for women who had received S&E bachelor's degrees in 1988 or 1989 was $21,600, about 73 percent of the $29,500 median salary of men (chart 1-8). For recent master's S&E degree recipients in 1990 (degree granted in 1988 or 1989), the ratio was 84 percent ($32,800 for women versus $39,000 for men). In 1989, among doctorates with one year or less of professional experience, the median salary for women ($35,500) was 88 percent of the median salary for men ($40,400). In comparison, ratios of women's salaries to men's in the overall work force in 1990 (based on median weekly earnings) were 73 percent for all full-time wage and salary workers over age 25,[36] 74 percent for full-time wage and salary workers in professional occupations,[37] and 89 percent for full-time wage and salary engineers.[38]

In 1986, salaries for women were lower than those for men in all S&E fields.[39] Among scientists, salaries for women averaged 75 percent of those for men (based on appendix B, table 24). This difference was partially due to the relatively low salaries earned by individuals in psychology, the life sciences, and the social sciences. In the computer specialties—the fastest growing field for both women and men during the eighties—women's salaries averaged about 85 percent of those for men. For engineers, the salary differential was 83 percent, with some fluctuations among major engineering fields.

Women doctoral scientists with one year or less of professional experience earned 96 percent of what men earned ($35,200 versus $36,700) and engineers 98 percent ($47,700 versus 48,500) (chart 1-8). By field, the differential for doctoral scientists ranged from 89 percent (environmental sciences) to 104 percent (psychology—appendix b; table 73).

Chart 1-8. Women salaries as a percentage of men's salaries, by field and level of degree



NOTE: Percentages for bachelor's and master's degrees are based on the 1990 salaries of 1988 and 1989 graduates; percentages for doctorates are based on 1989 salaries of Ph.D.'s with 1 year or less of professional experience

SOURCE: Appendix B; based on table 26 and 72.

In 1990, the median salary of women who had received baccalaureates in 1988 and 1989 in engineering was 2 percent higher ($33,800) than the salary of men ($33,000—chart 1-8). Women with degrees in science fields earned a median salary which was 20 percent less than that of men ($20,100 versus $29,500). However, this lower salary was partly due to the lower salaries of females in life sciences, social sciences and psychology where women's salaries were approximately 85 percent of men's salaries (appendix B, table 26). In all other

---

[34] See appendix A, "Technical Notes," for the definition of underemployment rate.

[35] Women and Minorities, p. 9.

[36] Employment and Earnings, vol. 38, p. 221.

[37] Employment and Earnings, vol. 38, p. 223.

[38] Employment and Earnings, vol. 38, p. 223.

[39] This paragraph excerpted from Women and Minorities, p. 10.

[40] Women and Minorities, pp. 10-11.

fields of science, women's salaries were within 5 percent of men's salaries.

At the master's degree level, women who graduated with degrees in science fields in 1988 and 1989 earned 88 percent of the median annual salary earned by their male colleagues in 1990 ($31,200 versus $35,400). Women with degrees in engineering earned a median salary ($40,100) equal to 96 percent of the salary of men ($42,000). In three fields, physical science, mathematics and psychology, women salaries were more than 10 percent below men's salaries.

MINORITY WOMEN

The following section focuses first on racial minorities (blacks, Asians, and Native Americans) and then on Hispanics. Data presented are limited by the small sample sizes for many of the racial/ethnic groups. The latest data available for all scientists and engineers in the United States are for 1986 and are excerpted from the 1990 edition of this report.[40]

Racial Minorities

Employment Levels and Trends

Racial minorities account for a larger proportion of employed women scientists and engineers than of men scientists and engineers. In 1986, about 10 percent of women scientists and engineers were members of racial minority groups (blacks, Asians, or Native Americans), compared with 7 percent for men.

The racial distribution of women scientists and engineers in 1986 was 87 percent white (608,900), 5 percent black (34,500), 5 percent Asian (36,300), and less than 1 percent Native American (2,700).[41] The remaining 2 percent were of mixed racial background or did not report their race. Among men scientists and engineers, about 2 percent were black, 5 percent were Asian, and less than 1 percent were Native American.

In 1986, black women accounted for 11 percent of all employed women in the United States,[42] compared to 5 percent of women in the S&E work force. On the other hand, Asians were more highly represented among women scientists and engineers (5 percent) than among all women in the general work force (2 percent).[43]

Among employed doctoral scientists and engineers, 7,747 women (10 percent of all employed women with doctorates) were members of racial minority groups in 1989 (based on appendix B; table 4). About 3 percent (2,236) of the women Ph.D.'s employed as scientists and engineers were black, 7 percent (5,328) were Asian, and 0.2 percent (183) were Native American. The comparable figures for men were 1.3 percent (4,954) black, 9.7 percent (35,911) Asian, and 0.2 percent (589) Native American.

In 1979, approximately 9 percent of all employed female doctoral scientists and engineers were members of racial minority groups. Although the numbers increased between 1979 and 1989, the pattern of minority representation was similar in both years. Of all employed female doctoral scientists and engineers in 1979, 2.4 percent (785) were black, 6.1 percent (2,028) were Asian, and 0.4 percent (117) were Native American.[44]

Field

In 1986, Asian women were more likely to be engineers than were other racial minority women. About 20 percent of Asian women were engineers; of women in other racial groups, between 11 percent (Native American) and 14 percent (white) were engineers.[45] This pattern holds for employed women doctoral scientists and engineers in 1989 (table 1-3). Employed Asian women with Ph.D. degrees are more likely to have doctorates in engineering (9 percent) than are Native Americans (7 percent), blacks (2 percent), or whites (3 percent). Furthermore, Asian women tend to have doctorates in the life sciences (42 percent) more often than do blacks (29 percent) or whites (34 percent).

Table 1-3. Field distribution of women doctoral scientists and engineers, by racial group: 1989 [Percentages]

Field	Total	White	Black	Asian	Native American
Scientists, total	97	97	98	91	93
Physical	8	7	4	18	10
Mathematical	2	2	2	5	1
Computer specialists	3	3	--	5	1
Environmental	2	2	--	2	1
Life	34	34	29	42	38
Psychologists	28	30	35	9	25
Social	19	19	28	11	17
Engineers, total	3	3	2	9	7

Double dashes (--) represent too few cases to estimate.
NOTE: Detail may not add to total because of rounding.
SOURCE: Based on Appendix B, table 4

Experience

Across all racial groups, more women than men scientists and engineers have fewer than 10 years of work experience. Among women, white and Asian scientists and engineers were more likely than blacks to report fewer than 10 years' professional experience in 1986 (about 58 percent each for whites and Asians, compared with 52 percent for blacks).[46]

---

[41] Data for Native Americans should be viewed with caution, because the estimates are based on an individual's own classification with respect to Native American heritage; such perceptions may change over time.

[42] Employment and Earnings, vol. 34, pp. 158-160.

[43] U.S. Bureau of the Census, Detailed Occupation and Years of School Completed by Age for the Civilian Labor Force by Sex, Race, and Spanish Origin: 1980, Supplementary Report #PC 80-S1-8, 1980 Census of the Population (Washington, DC: U.S. Government Printing Office, 1983), p. 7.

[44] Figures for 1979 are from Characteristics of Doctoral Scientists and Engineers: 1979, p. 7.

[45] Women and Minorities, p. 11.

[46] Women and Minorities, p. 11.

Black female scientists and engineers with doctorates were more likely to report fewer than 10 years of professional experience than were white or Asian women with S&E doctorates. In 1989, approximately 62 percent reported 10 or fewer years of professional experience, whereas 57 percent of white and 56 percent of Asian women did the same (based on appendix B, table 11).

Career Patterns

The proportion of women scientists and engineers who reported management as their primary work activity varied among racial groups. In 1986, black women were most likely to be primarily engaged in management activities (24 percent), followed by Asian women (22 percent) and white women (19 percent). Within all racial groups, lower proportions of women than men reported management as their major work.[47]

Other indicators of career patterns are tenure status and academic rank. In 1989, black women with doctorates were more likely (68 percent) to be in tenure-track positions—either tenured or waiting for tenure—than were white women (58 percent) or Asian women (42 percent) with doctorates (based on appendix B, table 17). Of those who were in tenure-track positions, the proportions tenured varied, with blacks (59 percent) less likely to be tenured than were whites (63 percent) but slightly more likely than Asians (57 percent).

Differences also exist in terms of the academic rank of doctoral women scientists and engineers within racial groups. In 1989, more white (19 percent) than Asian (16 percent) or black (15 percent) women held full professorships. Blacks were more likely to be at the assistant professor level (35 percent, compared with 28 percent of whites and 27 percent of Asians) (based on appendix B, table 20).

Labor Market Indicators [48]

The labor force participation rates of women scientists and engineers vary only slightly among the racial groups. In 1986, participation rates ranged from a low of 93 percent for Asian women to a high of 97 percent for Native Americans (appendix B, table 21).[49]

Although variation among racial groups was not large, whites earned the highest average annual salaries among women scientists and engineers. In 1986, white women scientists earned an average of $29,400, compared with $28,800 for Asian women scientists and $25,400 for black women scientists (appendix B, table 24). Among engineers, Asian women earned the highest annual salary—an average of $35,000 in 1986. Comparable salaries for white women engineers and black women engineers were $34,300 and $32,900, respectively.

At the doctoral level in 1989, black (96 percent) and Asian (95 percent) women participated in the labor force at slightly higher rates than did whites or Native Americans (93 percent) (appendix B, table 22). However, Asian women again had the highest median salaries—$45,800 compared with $44,700 for white women, $44,400 for black women, and $43,500 for Native American women (appendix B, table 25). No differences were more than 10 percent.

Regardless of racial group, all women scientists and engineers reported median annual salaries lower than those of men. The differential between the salaries of Asian women and Asian men was the largest. In 1986, Asian women earned salaries equal to 74 percent of Asian men's salaries, black women's median salaries were equal to 78 percent of black men's salaries, and white women's salaries were equal to 76 percent of white men's salaries.[50]

Among doctoral scientists, the differences between women's and men's salaries were not as large. In 1989, black women's salaries were 87 percent of black men's salaries, Asian women's were 82 percent of Asian men's, and white women's were 79 percent of white men's (based on appendix B, table 25).

Hispanics [51]

Hispanics are a diverse ethnic group; they include individuals of Spanish heritage from Central and South America, Asia, and Europe. In 1986, about 23 percent (4,600) of Hispanic women scientists and engineers were Mexican American, 30 percent (5,800) were Puerto Rican, and 45 percent (8,900) were classified as "other Hispanic"; the remainder (300) did not report their Hispanic origins. It would be desirable to differentiate among them because each of these groups may face different experiences in the S&E work force. Because of data limitations, however, Hispanics are treated in the aggregate.

Employment Levels and Trends [52]

Almost 3 percent (19,600) of women scientists and engineers in 1986 were Hispanic, compared with about 2 percent of men scientists and engineers (based on appendix B, table 2). The proportion for women was up from 2 percent (9,500) in 1982 (the earliest year for which comparable data are available). Among doctoral women scientists and engineers, Hispanics accounted for 2.2 percent (1,682) of those employed in 1989 (appendix B, table 4). Female Hispanic representation in the overall U.S. work force in 1990 was 3 percent.[53]

---

[47] Women and Minorities, p. 11.

[48] Because of small sample sizes for women scientists and engineers by racial/ethnic group, data on unemployment and underemployment are not reliable and therefore are not presented.

[49] Women and Minorities, p. 11.

[50] Women and Minorities, p. 11.

[51] Information for 1986 is from Women and Minorities, p. 12.

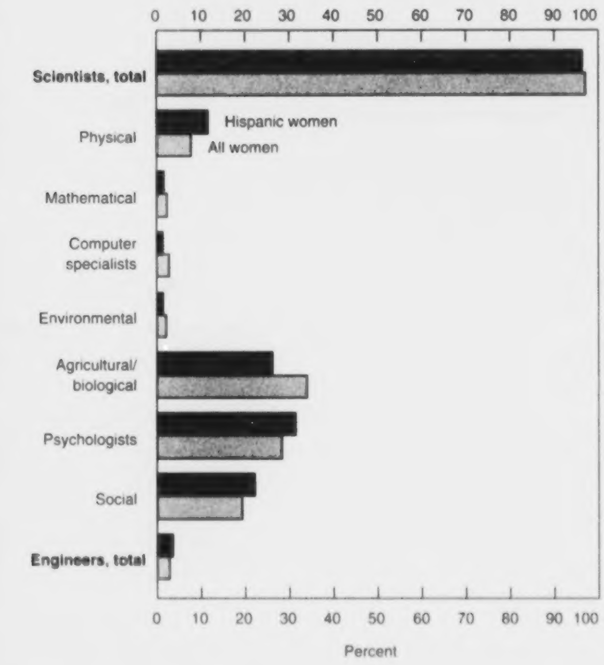
[52] Information for 1986 is from Women and Minorities, p. 12.

[53] Employment and Earnings, vol. 38, p. 208.

Field

In general, the S&E field distributions of Hispanic women and all women were fairly similar in 1986. However, Hispanics were more likely to be life scientists (21 percent versus 15 percent) and relatively less likely to be computer specialists (15 percent versus 22 percent).[54] In 1989, 32 percent of employed Hispanic female Ph.D.'s were psychologists; of other female Ph.D.'s, 28 percent were psychologists (chart 1-9). The lowest percentages of Hispanic female Ph.D.'s were in computer science (1 percent), environmental science, (2 percent), or mathematics (2 percent) (appendix B, table 4).

Chart 1-9. Field distribution of employed doctoral scientists and engineers--Hispanic women and all women: 1989



SOURCE: Based on appendix B, table 4

Experience

Hispanic women scientists and engineers have substantially fewer years of professional work experience than do all women. In 1986, almost 75 percent of Hispanics—compared with about 59 percent of all women—had fewer than 10 years' experience.[55] Among women with S&E doctorates, 70 percent of Hispanics had fewer than 10 years of professional experience in 1989, compared with 57 percent for all women with S&E doctorates (based on appendix B, table 11).

Career Patterns

Among academically employed doctoral scientists and engineers, fewer Hispanic women than others held the rank of full professor in 1989 (9 percent, compared with 18 percent of all women). The proportion of Hispanic women who were associate professors was about the same as for all women (22 percent versus 24 percent) (appendix B, table 20).

Labor Market Indicators

Hispanic women scientists and engineers are slightly less likely than are all women to be in the labor force. In 1986, the Hispanic labor force participation rate was 92 percent, compared with an overall rate of 94 percent. In 1990, the rate for Hispanic female Ph.D.'s was 97 percent (appendix B, table 22).

Hispanic women reported an average annual salary substantially lower than that of all women scientists and engineers ($25,200 versus $29,900) in 1986. Furthermore, Hispanic women's salaries were equal to only 69 percent of Hispanic men's; in comparison, for all scientists and engineers, the salaries of women were equal to 75 percent of the salaries of their male colleagues.[56] Among doctoral scientists and engineers, Hispanic women reported median salaries slightly lower than those of all women in 1989 ($42,700 and $44,800, respectively) (appendix B, table 25). Hispanic women with Ph.D.'s in S&E had median annual salaries equal to 84 percent of their Hispanic male colleagues' salaries.

---

[54] Women and Minorities, p. 12.

[55] Women and Minorities, p. 12.

[56] Women and Minorities, p. 12.

chapter 2

education and training of women in science and engineering

OVERVIEW

One major factor contributing to women's underrepresentation in the science and engineering (S&E) work force is that, at any educational level, women do not participate in science and mathematics training to the same extent as do men. Differences in participation—and interest—in mathematics and science appear first at the elementary and middle school levels. For example, the results of mathematics skill assessments (made at ages 9, 13 and 17) indicate that females' performance starts to lag behind that of males among 13-year-olds (middle school). On science assessments (also made at ages 9, 13 and 17), females score lower than males as early as age 9 (elementary school).

Although females take almost the same number of years of mathematics and science coursework, they are less likely to take advanced coursework in these subjects. These data, taken together with differences on mathematics and science skill assessments, indicate not only that potential leakages in the S&E education pipeline are greater for females than for males, but that the leakages for females occur very early in their precollege experience.

Lower participation in mathematics and science coursework and lower levels of performance on skill assessments in these subjects are partially reflected in the lower scores of females on examinations measuring mathematics and science achievement. For example, in 1991, females' scores on the mathematics component of the Scholastic Aptitude Test (SAT) were 44 points lower than males'. Lower proportions of females than males also scored in the highest range on this exam: in 1991, 6 percent of females and 14 percent of males scored above 650 (score range is 200 to 800).

The number of S&E bachelor's degrees awarded to women increased by 21 percent between 1979 and 1989; in comparison, the number awarded to men declined by 1 percent. The largest percentage increases for women have occurred in two fields: computer science and engineering.

Progress is also apparent at the graduate level. Enrollment of women in S&E graduate programs jumped 30 percent between 1982 and 1990, compared with a 12-percent increase for men. In addition, although women still tend to be concentrated in graduate programs in psychology and the social or life sciences, their numbers have increased dramatically in engineering and computer science over the last several years.

Finally, women are also applying for—and receiving—Federal assistance for graduate study in greater numbers. Almost 2,700 women applied for National Science Foundation (NSF) Graduate Fellowship awards in science and engineering in 1990, accounting for almost 40 percent of the applicants. In 1975, women's share of applications was less than one-third.

PRECOLLEGE PREPARATION

Mathematics and Science Achievement

This section examines cognitive differences in mathematics and science achievement exhibited by females and males at three precollege levels: elementary, middle, and secondary. The information in this section is based on results from mathematics and science assessments administered by the National Assessment of Educational Progress (NAEP), part of the Educational Testing Service. Since the late sixties, NAEP has conducted surveys of student proficiency in several content areas on national samples of students at the 9-, 13-, and 17-year-old age levels. The objective of these assessments is to determine how specific groups of U.S. students respond to exercises in different academic areas; the assessments are not intended to measure the performance of individual students. Achievement is assessed on a common scale of 0 to 500.

Mathematics [1]

Proficiency in mathematics is measured at five levels on a 500-point scale:

- Level 150 indicates proficiency with simple arithmetic facts.
- Level 200 shows beginning skills and understanding.
- Level 250 shows an understanding of basic operations and beginning problem-solving ability.
- Level 300 indicates proficiency in moderately complex procedures and reasoning.

---

[1] All information on mathematics assessment scores is based on table 27 in appendix B of this report.

- Level 350 shows mastery of both multistep problem solving and algebra.[2]

Nine-Year-Olds. Assessments are similar for 9-year old girls and boys. Between 1973 and 1990, overall mean scores on the mathematics assessment edged upward for both females and males; however, progress by males has been greater. In 1990, mean scores were 230.2 for females and 229.1 for males, up from 220.3 for females and 217.7 for males in 1973.

Levels of proficiency for females and males in this age group are remarkably similar. In 1990, virtually all students (99 percent) scored above level 150, indicating a mastery of simple arithmetic facts. Furthermore, 28 percent of both female and male 9-year-olds scored above level 250, showing a basic understanding of simple operations and problem-solving skills.

Thirteen-Year-Olds. The achievement test scores of females at this age level are also similar to those of males. In 1990, mean scores for females and males were 269.6 and 271.2, respectively. Although the 1990 scores are close, scores for males have shown a slightly greater increase since 1973. The 1990 scores represent an increase of 2.7 points for females, who had a mean score of 266.9 in 1973, and 6.1 points for males, whose mean score was 265.1.

In 1990, 16 percent of female and 19 percent of male 13-year-olds scored above level 300 (moderately complex procedures and reasoning). Scores have increased, however, for both females and males, especially at the basic problem-solving level (level 250). In 1978, 66 percent of female and 64 percent of male 13-year-olds scored above 250 on this assessment; by 1990, these percentages were 74 percent and 75 percent, respectively.

Seventeen-Year-Olds. The largest difference in mean scores occurs at this age level. The mean score of females in 1990 (302.9) was more than 3 points lower than that of males (306.3). Since 1973, changes in scores have not been significant for either group.

Lower percentages of females than males score above proficiency levels 300 (moderately complex procedures and reasoning) and 350 (mastery of both multistep problem solving and algebra). In 1990, 55 percent of females, compared with 58 percent of males, scored over 300, and 6 percent of females, compared with slightly less than 9 percent of males, scored above level 350.

Science[3]

For science, the five proficiency levels are defined as follows:

- Level 150 shows knowledge of everyday science facts.
- Level 200 indicates an understanding of simple scientific principles.
- Level 250 shows an ability to apply basic scientific information.
- Level 300 indicates skill in analyzing scientific procedures and data.
- Level 350 shows an ability to integrate specialized scientific information.[4]

Nine-Year-Olds. Although females' performance has consistently been slightly lower than that of males, the gap narrowed between 1973 and 1990. In 1990, overall means for females and males were 227.1 and 230.3, respectively. Females scored, on average, 3.2 points lower than males. In 1973, females scored an average of 4.1 points lower than males. Mean scores for 1973 were 218.4 for females and 222.5 for males.

Small differences in proficiency are evident among male and female 9-year-olds. Whereas 29 percent of females scored over 250 (ability to apply basic scientific information), 33 percent of males did so. The proportions showing an ability to analyze scientific procedures and data (level 300) were 2 percent for females and 4 percent for males.

Thirteen-Year-Olds. In this age group also, females tend to score lower than males on the science assessment. In fact, 1990 scores show that the gap has widened since 1973. The overall mean score for females in 1990 (251.8) was almost 7 points lower than that for males (258.5). In 1973, the difference between scores for females (247.1) and males (251.7) was about 5 points.

Females also lag behind males in levels of scientific proficiency. About 53 percent of female 13-year-olds, but 60 percent of males, scored above level 250 (application of basic scientific information) on the most recent assessment. Likewise, the percentage who scored above level 300 (ability to analyze scientific procedures and data) was lower for females (9 percent) than for males (14 percent).

Seventeen-year-olds. The biggest difference in mean scores was found for this age group. In 1990, the overall mean of 285.1 for females was 10 points lower than that for males (295.6). These scores represent a decline from 1973 scores for both females, whose mean score in 1973 was 288.3, and males, whose mean score was 304.3.

---

[2] For a more detailed discussion of the mathematics assessment and levels of proficiency, see U.S. Department of Education, National Center for Educational Statistics (NCES), National Assessment of Educational Progress Program, Trends in Academic Progress Achievements of American Students in Science 1970-90, Mathematics 1973-90, Reading 1971-90, and Writing 1984-90, forthcoming, 1992. Report is prepared by ETS (Educational Testing Service).

[3] All information on science assessments is taken from table 28 in appendix B of this report.

[4] For a more detailed discussion of the science assessment, see U.S. Department of Education, NCES, National Assessment of Educational Progress Program, Trends in Academic Progress Achievements.

Females and males exhibit substantial differences in proficiency levels at this age. For example, the proportions scoring above 300 (ability to analyze scientific procedures and data) were 39 percent for females and 48 percent for males. The proportions scoring at or above level 350 (integration of specialized scientific information) were 6 percent (females) and 13 percent (males).

Characteristics of College-Bound Seniors

Data on college-bound seniors collected by the Admissions Testing Program of the College Entrance Examination Board provide a comprehensive and robust source of material on this population. This section examines

- coursework in high school,
- scores on the SAT,
- scores on the SAT Achievement Test series,
- scores on advanced placement examinations, and
- undergraduate plans of college-bound seniors.

Coursework

The most current data on number of years and type of science and mathematics courses taken in high school are for college-bound seniors. This population consists of individuals who take the SAT and complete its Student Descriptive Questionnaire.

In 1991, females reported completing an average of 3.7 years of mathematics coursework; the average for males was 3.8 years (appendix B, table 29). Although the number of years of study does not differ substantially between the sexes, females tend to take less advanced coursework in mathematics than do males. For example, over 90 percent of both females and males reported taking a geometry course, but a smaller percentage of females than males reported taking trigonometry (53 percent versus 58 percent) or calculus (17 percent versus 22 percent). Additionally, females were less often enrolled in honors mathematics courses than were males (22 percent compared to 24 percent).

In 1990, female college-bound seniors had studied natural science for an average of 3.2 years, compared with 3.3 years, for males. As is the case for math, coursework composition varies by sex. Almost all students, both female and male, had taken biology, but females were much less likely to have taken physics (37 percent, compared with 51 percent of males). The percentage who reported taking honors courses in physics was about the same for females (21 percent) than for males (22 percent).

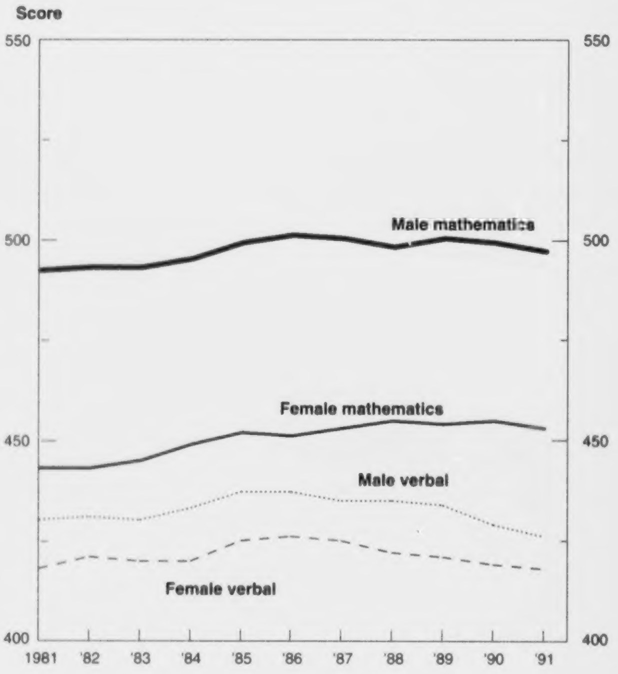
There were fewer differences by sex for social science courses. Females and males had each taken about 3.4 years of coursework in these subjects. More females than males reported taking sociology (females, 17 percent; males, 12 percent) or psychology (females, 31 percent; males, 20 percent) classes. About the same proportion of females and males—approximately half—had taken economics in high school. Slightly more females (23 percent) than males (21 percent) had taken honors courses in social science.

Scholastic Aptitude Test Scores [5]

In 1991, females continued to score somewhat lower than males on the verbal component and substantially lower on the mathematics portion of the SAT (chart 2-1). Although there has been some fluctuation over the decade, differences in scores between females and males have narrowed on both the verbal and the mathematics sections since 1981. Scores for females have remained relatively constant and scores for males have decreased.

The mean verbal score for females in both 1981 and 1991 was 418; the mean verbal score for males fell from 430 in 1981 to 426 in 1991 (appendix B, table 30). The overall trend has been similar for both females and males: scores rose until the mid-eighties, then started to decline. Over the last 2-year period (1990 and 1991), scores for both females and males have continued to decline.

Chart 2-1. SAT scores, by sex: 1981-91



NOTE: The score range is 200 to 800 for each component.
SOURCE: Based on appendix B, table 30

---

[5] The Admissions Testing Program of the College Board offers the SAT to college-bound seniors. The examination consists of two components. The verbal component tests reading comprehension and vocabulary skills, and the mathematics component assesses the ability to solve problems by using arithmetic reasoning and basic algebra and geometry skills. The score range is 200 to 800 for each component.

The percentile rankings on the verbal component were similar for females and males in 1991. Roughly 3 percent of both females and males scored in the 650 to 800 range (appendix B, table 31). Rankings for both sexes were also similar at lower score ranges: 18 percent of females and 19 percent of males scored between 500 and 599, and 32 percent of both females and males scored between 400 and 499.

On the mathematics component, scores rose over the 10-year period by 10 points for females (from 443 to 453) and 5 points for males (from 492 to 497) (appendix B, table 30). The 10-year trend in scores differed between the sexes. For females, scores began to increase steadily in 1982, reaching a high of 455 in 1990. For males, scores increased to a high of 501 in 1986, followed by slight declines. In the last 2 years, scores for males have fallen.

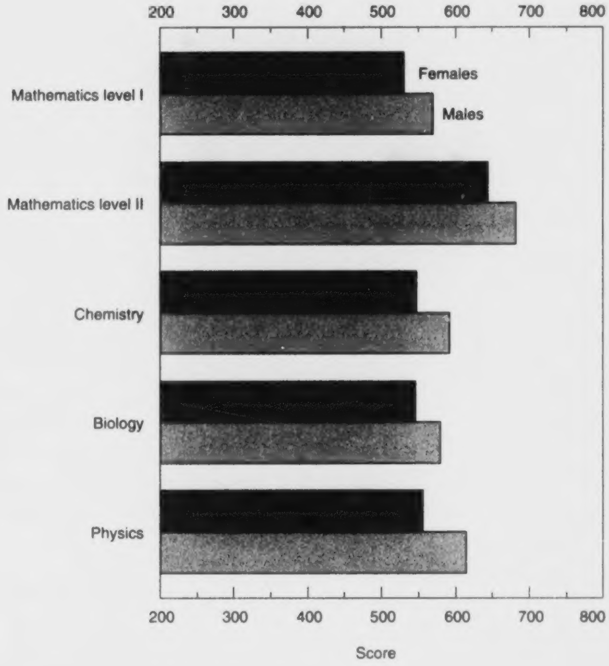
Females are much less likely than males to score in the 650 to 800 range on the mathematics component (appendix B, table 31). In 1991, only 6 percent of females, but about 14 percent of males, scored in this range. This difference has increased since 1981, when the proportions were 4 percent for females and 10 percent for males. However, the majority of both males (53 percent) and females (54 percent) scored in the 400 to 599 range in 1991.

Achievement Test Scores [6]

Females are less likely than males to take achievement tests in science and mathematics.[7] In 1991, females accounted for 47 percent of test-takers who took one or more achievement exams in a science or mathematics field;[8] they also accounted for 52 percent of college-bound seniors who took the SAT.[9] Among students who took science and mathematics achievement tests, 24 percent of those who took the physics test were female, as were 54 percent of those who took the math I test and 53 percent of those who took the biology test.[10]

Scores on science and mathematics achievement tests were consistently lower for females than for males throughout the period from 1981 to 1991. In 1991, score differences ranged from 33 points on the biology test to 59 points on the physics exam (chart 2-2). These differences have remained fairly constant over the decade, with the exception of scores on the biology test, for which the difference in 1981 was 40 points.

Chart 2-2. Science and mathematics achievement test scores, by sex: 1991



NOTE: The score range is 200 to 800 for each test.

SOURCE: Based on appendix B, table 32

The SAT mathematics scores for those who took one or more science or mathematics achievement tests are also lower for females than for males. In 1991, the difference in scores between males and females for the mathematics level I test was 49 points (595 versus 546) (appendix B, table 32). The narrowest gap in SAT mathematics scores (33 points) was for those who took the physics exam (676 versus 643 points). Point differences in scores for other tests were 44, 45, and 51 points for mathematics level II, chemistry, and biology, respectively.

Advanced Placement Examinations Scores [11]

In a pattern similar to that found among achievement test-takers, females account for a smaller share of advanced placement science and mathematics test-takers. Their proportion, however, has increased rapidly over the past 17 years. In 1990, females represented about 51 percent of all advanced placement test-takers,[12] up from 41 percent in 1973 and 48 percent in 1988.[13] However, females tended to take fewer advanced placement science and mathematics/computer science exams. In 1990, females took 49 percent of approximately 481,000 advanced placement exams taken by students. Representation of females differs by advanced placement test topics. Among science fields, roughly 52 percent of the biology tests, 34 percent of the chemistry tests, and 17 percent of the physics C-electricity/magnetism tests were taken by females[14] (chart 2-3). Among candidates in the mathematics/computer science fields, female representation ranged from about 43 percent of mathematics/calculus AB[15] test-takers to 16 percent of the computer science AB[16] test-takers.

---

[6] In addition to the SAT, the Admissions Testing Program offers an achievement test series to college-bound seniors. The series includes 1-hour multiple choice exams in 14 academic areas. About one in five of those students who take the SAT also take one or more of the achievement tests. The score range is 200 to 800 for each component.

[7] Of the 14 academic subjects in which achievement tests were administered in 1991, 5 were in science and mathematics fields: mathematics level I, mathematics level II, biology, chemistry, and physics.

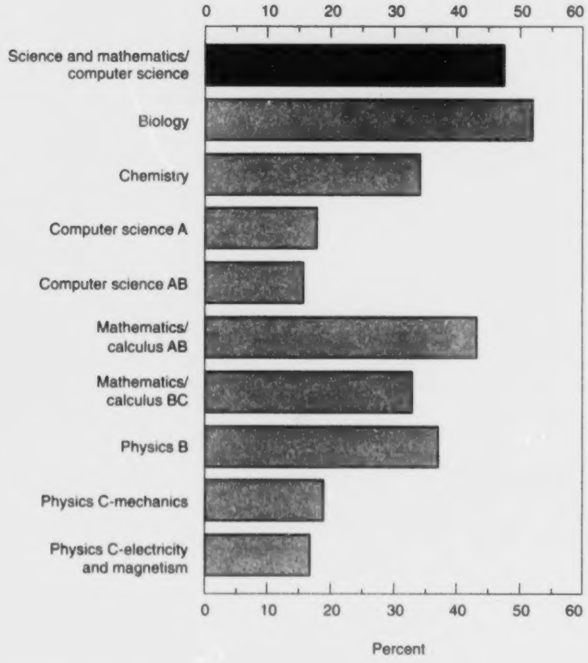
[8] College Bound Seniors, 1991 Profile of SAT and Achievement Test Takers, National Report (Princeton, NJ: Educational Testing Service, 1991), p. 11, and unpublished tabulations for females. This percentage was obtained by combining data for five science and math fields.

[9] College Bound Seniors, National Report, p. 6.

[10] College Bound Seniors, National Report, p. 6.

[11] The College Board also administers the Advanced Placement Program. In this program, a series of exams are offered in 29 areas, 9 of which are in science and mathematics/computer science. A student who does well on one or more of these exams may be granted college credit or appropriate placement by participating higher education institutions. The advanced placement grading scale ranges from 1 (no recommendation for credit) to 5 (extremely well qualified in the subject area). About 15 percent of college-bound seniors participate in this program.

Chart 2-3. Proportions of students who took science and mathematics advanced placement tests who were female: 1990



SOURCE: 1990 Advanced Placement Program, National Summary Reports (Princeton, NJ: Educational Testing Service, 1990)

Females continued to score lower than males on the science and mathematics/computer sciences advanced placement examinations in 1990 (table 2-1). Scores for females were generally in the 2-point (possibly qualified) to 3-point (qualified) range for each of the exams, scores for males were around the 3-point mark (qualified) or higher. Females scored in the fully qualified range only on the mathematics/calculus BC and AB exams (average scores of 3.48 and 3.07, respectively) and on the physics C-electricity and magnetism exams (average score of 3.01). The trends in scores on these tests have been the same for females and males for the last several years.

Table 2-1. Advanced placement examination scores for female and male test-takers: 1990

Exam	Females	Males
Biology	2.80	3.13
Chemistry	2.65	3.09
Physics B	2.37	2.96
Physics C-mechanics	2.90	3.47
Physics C-electricity and magnetism	3.01	3.38
Mathematics/calculus AB	3.07	3.35
Mathematics/calculus BC	3.48	3.74
Computer science AB	2.35	2.90
Computer science A	2.37	3.03

SOURCE: Appendix B, table 33

Intended Undergraduate Major[17]

Females are slightly more likely than males to choose a science major, but males are much more likely than females to choose engineering. In 1991, roughly 25 percent of females—compared with 22 percent of males—intended to major in a science field (appendix B; table 34). Both of these proportions have been declining since 1983, however, when about 27 percent of females and 30 percent of males planned science majors. The decline is the result of a sharp decrease in interest in computer science programs. When interest in computer science peaked, in 1983, about 9 percent of females and 12 percent of males chose computer science as their undergraduate field. By 1991, these percentages had fallen to 2 percent and 4 percent, respectively. Within science fields, there were substantial differences between females and males (chart 2-4). The majority of females (55 percent) intended to major in the social sciences, whereas only 23 percent of the males intended to do so.

---

[12] 1990 Advanced Placement Program, National Summary Reports, Advanced Placement Program of the College Entrance Examination Board (Princeton, NJ: Educational Testing Service, 1990).

[13] Advanced Placement Program, The College Board, AP Yearbook 1988 (New York: The College Entrance Examination Board, 1988), p. 5.

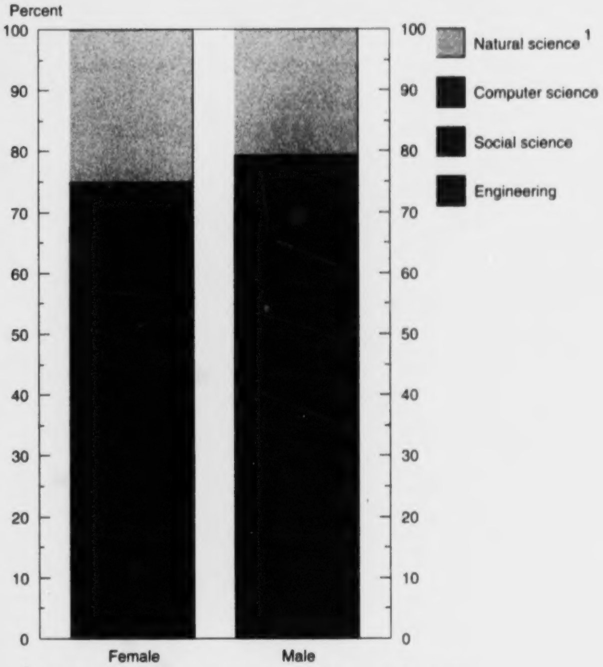
[14] The physics C-electricity/magnetism advanced placement exam and the physics C-mechanics exam allow a student the opportunity to earn placement or credit in only one of these areas of physics. In contrast, the physics B exam covers all aspects of physics, and a student who scores well on this exam may earn as much as a semester's course credit in this field.

[15] Two advanced placement exams are offered in mathematics/calculus. The calculus AB exam is not as rigorous as the calculus BC exam. Although up to a full year of college credit may be earned by those who score well on the BC test, scores on the AB test are used primarily for appropriately placing students in courses.

[16] In 1988, the examination for computer science placement was divided into two separate tests. The computer science A exam concentrates on programming methodology and procedural abstraction. The computer science AB exam includes all questions on the A test but contains more in-depth material on algorithms, data structures, and data abstraction.

[17] The intended undergraduate major of college-bound seniors is determined by answers to questions on the Student Descriptive Questionnaire distributed to all college-bound seniors as part of the SAT application package. The questions ask students to choose their first choice of college curriculum from a list of 29 major categories, of which 6 are in science and 1 is in engineering.

Chart 2-4. Intended undergraduate S&E major, by sex: 1991



1 Includes physical sciences, mathematics, biology, and agriculture.

SOURCE: 1991 Profiles of SAT and Achievement Test Takers (Princeton, NJ: Educational Testing Service, 1991)

Also in 1991, only 4 percent of females, but 18 percent of males, intended to major in engineering (based on appendix B; table 34). During the eighties, the propensity to choose engineering declined for males, but remained relatively constant for females.

SAT mathematics scores for college-bound seniors who plan to major in a science or engineering field are generally lower for females than for males. These scores varied widely by major, however. For example, the 1991 score range for females was 406 (computer science) to 585 (mathematics); for males, the range was 441 (agriculture) to 623 (mathematics) (appendix B, table 34). Nationally, math scores were 453 and 497 for females and males, respectively (appendix B; table 30).

UNERGRADUATE EDUCATION

Characteristics of American Freshmen

Data on freshmen are collected annually by the Cooperative Institutional Research Program at the University of California, Los Angeles.[18] The survey reflects responses from a national sample of American freshmen at 4-year colleges and universities.[19]

Grade Point Average

Most recent grade point average (GPA) data indicate that students who intend to major in science and engineering fields are more academically prepared than students in other programs; this statement is true regardless of sex. For example, almost 40 percent of both females (39 percent) and males (38 percent) who indicated they would probably major in S&E fields reported a high school GPA in the A range in 1990 (appendix B, table 35). Overall, these proportions were 27 percent for females and 21 percent for males.

The percentage of female freshmen with A averages who intend to major in S&E fields has not changed over the decade; 41 percent had A averages in 1980. In comparison, 35 percent of freshmen males who were potential S&E majors reported a high school GPA in the A range. Overall, the proportions of females and males with A averages were 27 percent and 19 percent, respectively.

Degree Aspirations

Among 1990 freshmen planning to major in science and engineering, the highest proportion of both females and males (35 percent and 39 percent, respectively) indicated a master's degree as their highest planned degree (appendix B, table 35). Of other degrees, females planned to study for a doctorate, medical, or law degree to a greater extent than did males. For example, 27 percent of females, compared with 22 percent of males, planned to obtain a Ph.D.

Degree aspirations have not changed for female freshmen over the decade. In 1980, 35 percent of female freshmen planning to major in S&E fields stated that a master's was the highest degree they planned to obtain. A slightly smaller percentage (36 percent) of males in 1980 than in 1990 had similar educational aspirations.

Level of Parents' Education

Both female and male prospective science and engineering majors report similar educational credentials for their parents.

---

[18] The Graduate School of Education at UCLA and the American Council of Education jointly sponsor the Cooperative Institutional Research Program. The program was introduced in 1966 as a continuing longitudinal study of the American higher education system. One of the cornerstones of the program is the American Freshmen Norm Survey.

[19] The American Freshman Norm Survey, Cooperative Institutional Research Program, Graduate School of Education, University of California, Los Angeles. Although freshmen at 2-year colleges are surveyed, only responses for those at 4-year colleges and universities are reported here.

In 1990, 49 percent of females and 53 percent of males indicated that their fathers had either a baccalaureate or a graduate degree (appendix B, table 35). The mothers of 39 percent of the females and 42 percent of the males had a baccalaureate or a graduate degree.

Annual Parental Income

Estimated parental income is also very similar for both females and males who intend to major in an S&E field. For example, in 1990, 45 percent of females and 48 percent of males reported that their parents' annual income was above $50,000 (appendix B, table 35). At the lower income brackets, 16 percent of females and 11 percent of males placed their parents' income at less than $20,000 per year.

Plans for Financial Aid

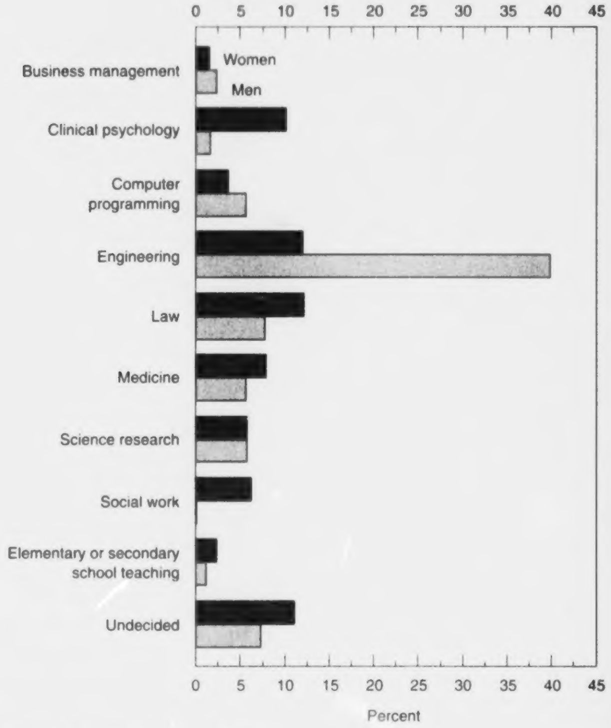
A large proportion of both female (54 percent) and male (48 percent) 1989 freshmen expressed "some" concern about financing their education.[20] Furthermore, 16 percent of the females and 11 percent of the males expressed "major" concern. Similarly, among 1989 freshmen planning S&E majors, the proportion stating that they had "some" or "major" concern about financing their education was higher among females (54 percent and 16 percent) than among males (51 percent and 11 percent).

Two types of financial support were listed by a majority of both male and female S&E students: relatives and savings. In 1989, approximately 86 percent of the women and 82 percent of the men said that relatives were a major source of financial support; 60 percent of the females and 58 percent of the males said they used savings from summer work. Another source that was cited by over a quarter of the students of each sex (females, 30 percent; males, 27 percent) was grants or scholarships other than Pell grants, Supplementary Educational Opportunity Grants, or State or local college work study grants.

Intended Career

Whereas socioeconomic characteristics of female and male freshmen who are prospective science and engineering students do not differ substantially, the intended career choices of these students do (chart 2-5). In 1990, the differences were particularly noticeable among students planning careers in clinical psychology, social work, and engineering. About 10 percent of females, but less than 2 percent of males, planned a career in clinical psychology or social work. In contrast, 12 percent of females and 40 percent of males planned careers in engineering. Among other fields, females more often chose law (12 percent versus 8 percent), whereas males more often chose computer programming (6 percent versus 4 percent). Very few of either sex (females, 2 percent; males, 1 percent) planned an elementary or secondary school teaching career.

Chart 2-5. Intended career choices of female and male freshmen majoring in S&E fields, by selected occupation: 1990



SOURCE: Based on appendix B, table 36

Graduate Record Examination[21]

The Educational Testing Service offers a series of tests—the Graduate Record Examination (GRE)[22]—to potential graduate students who plan further study in the arts and sciences. GRE scores, which are used primarily by graduate and professional schools to supplement undergraduate records, may also be used to examine undergraduate S&E preparation.

Although more women (111,900) than men (97,600) took the GRE in 1987,[23] women test-takers were much less likely than men to have majored in a science or engineering field at the undergraduate level (49 percent versus 72 percent).[24] The average scores of those test-takers who majored in S&E fields were higher than the average scores of all test-takers on every component of the exam (chart 2-6).

---

[20] Alexander Astin, William S. Korn, and Ellyne R. Berz, The American Freshman: National Norms for Fall 1989, Cooperative Institutional Research Program, University of California, Los Angeles, December 1990, pp. 23 and 39. Information for 1989 is presented because this question was not asked in the 1990 survey. Information for freshmen majoring in S&E fields is from unpublished tabulations.

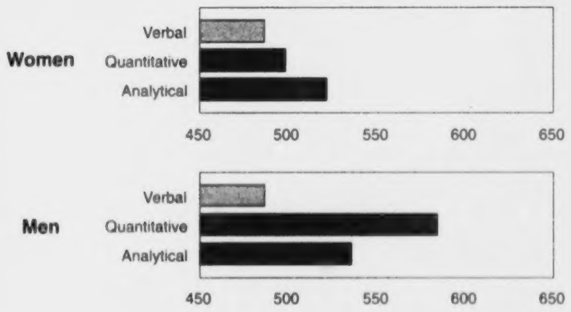
[21] GRE data more recent than 1987 were unavailable in the format needed to update this report; therefore, this section is extracted from the 1990 report.

[22] The GRE consists of a general aptitude test and advanced tests in 20 subject areas. The aptitude test comprises three components. The verbal component assesses the ability to use words in solving problems; the quantitative portion tests the ability to apply elementary mathematical skills and concepts to solve quantitative problems; and the analytical component, a relatively new addition to the test (1979), measures deductive and inductive reasoning skills. The score range on the GRE is 200 to 800.

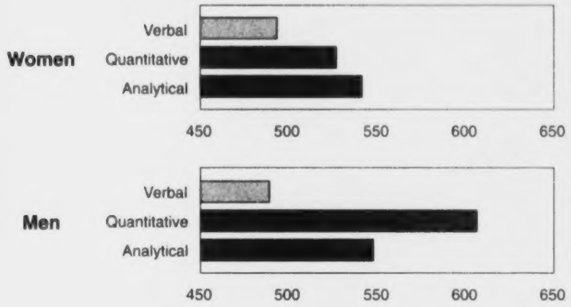
[23] Graduate Record Examination Board, A Summary of Data Collected from Graduate Record Examination Test-Takers During 1986-87, Data Summary Report no. 12 (Princeton, NJ: Educational Testing Service, 1988), p. 68.

Chart 2-6. GRE scores, by sex--all test-takers and test-takers who majored in science and engineering: 1987

All GRE test-takers



Test-takers who majored in science and engineering



NOTE: The score range is 200 to 800 for each component.
SOURCE: Appendix B, table 37, and unpublished data

In 1987, among those who majored in S&E fields, women generally scored slightly higher than men on the verbal component, much lower on the quantitative, and slightly lower on the analytical. These differences generally persisted across fields, but with wide variations (table 2-2). For example, women who majored in engineering scored higher than men on the verbal and analytical sections by roughly 30 points and 40 points, respectively, but scored lower (12 points) on the quantitative component.

Between 1979 (the earliest year for which comparable data are available) and 1987, scores for both men and women who majored in S&E fields remained essentially the same on the verbal component but rose on the other two components (appendix B, table 37). Some of the most dramatic increases occurred for women majoring in biological science or engineering. On the quantitative component, scores for these women rose from 528 to 558 (biological science) and from 603 to 663 (engineering). The corresponding increases in analytical scores were from 526 to 563 and from 534 to 601. Scores for men in these fields also rose, but to a lesser extent.

Table 2-2. GRE scores for female and male test-takers, by undergraduate major: 1987

Component and field	Females	Males
Verbal		
Physical science	509	504
Mathematical science	474	488
Biological science	506	502
Behavioral science	504	513
Social science	456	461
Engineering	492	461
Quantitative		
Physical science	615	648
Mathematical Science	635	670
Biological science	558	585
Behavioral science	494	539
Social science	454	511
Engineering	663	675
Analytical		
Physical science	580	568
Mathematical science	585	590
Biological science	563	551
Behavioral science	530	530
Social science	493	495
Engineering	601	557

NOTE: The score range is 200 to 800 for each component.
SOURCE: Appendix B, table 37

Bachelor's Degree Production[25]

Almost 308,000 science and engineering bachelor's degrees were granted by U.S. institutions in 1989; almost 124,000 (40 percent) of these were earned by women. A decade earlier, women earned almost 102,300—35 percent—of these degrees (appendix B; tables 38 and 40). By field, women were more highly represented in the sciences than in engineering (table 2-3), although with considerable variation among fields.

Women are more likely than men to earn degrees in life and social sciences and in psychology; men are more heavily concentrated in engineering fields. In 1989, approximately two-thirds of women who received S&E bachelor's degrees earned degrees in the social sciences (27 percent), psychology (28 percent), or agricultural and biological sciences (19 percent). In contrast, only 8 percent received degrees in engineering, and most were in electrical engineering (3 percent) (based on Appendix b; table 40). Almost one-third of men earned degrees in engineering, with the largest shares in

---

[24] For the purposes of this analysis, S&E fields include physical sciences, mathematical sciences, engineering, biological sciences, behavioral sciences, and social sciences.

[25] Data for bachelor's degrees in science and engineering are from the U.S. Department of Education, National Center for Education Statistics' annual Survey of Earned Degrees; these have been grouped into science and engineering categories used by NSF. Therefore, these data may differ from those in reports published by the U.S. Department of Education.

Table 2-3. S&E bachelor's degrees granted to women, by field: 1989

Field	Number of women	Percentage of total
Total	123,793	40.2
Sciences, total	113,549	47.2
Physical	4,371	30.9
Mathematical	7,106	46.0
Computer	9,545	30.8
Earth/atmospheric and oceanographic	801	25.2
Agricultural/biological	23,825	45.3
Psychology	34,663	70.8
Social	33,238	44.3
Engineering, total	10,244	15.2
Aeronautical/astronautical	301	10.2
Chemical	1,170	27.9
Civil	1,174	14.6
Electrical	3,188	13.1
Industrial	1,261	30.6
Mechanical	1,680	11.0
Materials/metallurgy	261	23.4
Other	1,209	16.6

SOURCE: Based on appendix B, tables 38 and 40

electrical (12 percent), mechanical (7 percent), and civil specialties (4 percent). Among science fields, the largest proportions of men earned degrees in social sciences (23 percent) or computer sciences (12 percent).

Between 1979 and 1989, these patterns of S&E degree production changed markedly. Overall, the number of S&E baccalaureates earned by women in 1989 was 21 percent higher than the number earned in 1979; men earned 1 percent fewer degrees in 1989 than in 1979.

GRADUATE EDUCATION

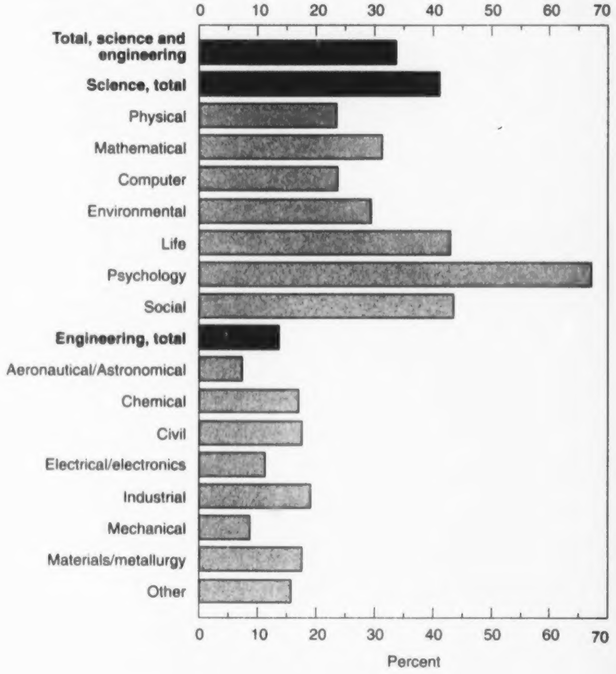
Graduate education represents another critical point in the science and engineering pipeline. Because an advanced degree is considered an entry-level requirement in many S&E fields, students who terminate their formal education at the undergraduate level may be precluded from working in their field of study. This section concentrates on several aspects of graduate education, including the following:

- Graduate enrollment in S&E programs.
- Graduate degree attainment rates in S&E fields.
- Advanced degree production in S&E fields.
- Sources of support for those pursuing S&E doctorates.
- Characteristics of NSF fellowship recipients.

Graduate Enrollment[26]

In 1990, women constituted about one-third (135,277 of 401,569 students) of the graduate enrollment in science and engineering programs; this proportion in 1982[27] was 31 percent (104,105 of 340,707 students; appendix B, tables 42 and 44). Representation of women varies considerably by field (chart 2-7). For example, within science fields, women accounted for about two-thirds of enrollment in psychology programs; within engineering, the largest fraction (19 percent) of women was in industrial engineering.

Chart 2-7. Women as a percentage of graduate enrollment, by S&E field: 1990



SOURCE: Based on appendix B, tables 42 and 44

Most women who were enrolled in graduate programs in 1990 were in one of three fields: social sciences, psychology, or life sciences. Only about 11 percent were enrolled in engineering fields, most often electrical (3 percent) and civil and industrial (2 percent) engineering. Men, in contrast, were most highly concentrated (35 percent) in engineering graduate programs, primarily in the electrical (11 percent), mechanical (6 percent), and civil (5 percent) subfields (based on appendix B, tables 43 and 44).

---

[26] Data presented in this section are from the NSF's Survey of Graduate Science and Engineering Students and Postdoctorates. This survey has been conducted annually since 1966. The most recent survey was completed in 1990.

[27] The earliest year for which comparable data are available.

The majority of both women (65 percent) and men (68 percent) were enrolled full-time in graduate S&E programs (based on appendix B, table 45). In science fields, 66 percent of the women were enrolled full-time and 71 percent of the men; in engineering similar percentages of women (59 percent) and men (61 percent) were enrolled full-time.

Since 1982, there have been substantial changes in these distributions, resulting from very different growth rates over the 8-year period. Overall, graduate enrollment of women in S&E fields increased by 30 percent between 1982 and 1990; this increase was significantly higher than the 12-percent growth rate experienced by men. For women, the fields with the greatest increase between 1982 and 1990 in the number enrolled were engineering (67 percent), and computer and physical sciences (50 percent). The greatest increases for men were in computer science (83 percent) and engineering (25 percent). Growth rates were much lower for women in earth, atmospheric, and oceanographic sciences, and the social and life sciences; the number of men enrolled in graduate programs in these fields increased only slightly or declined.

Graduate Degree Attainment Rates

An indicator of the progress made by women in earning advanced S&E degrees is the graduate degree attainment rate—that is, a group's propensity to complete graduate degrees. At the master's degree level, this rate is defined as the number of S&E master's degrees expressed as a percentage of the number of S&E bachelor's degrees awarded 2 years earlier. At the doctorate level, attainment is measured by the actual median elapsed time between baccalaureate and S&E doctorate, as reported by new doctorate recipients.[28]

Master's Degree Attainment[29]

In 1989, the master's degree attainment rates were 17 percent for women and 24 percent for men. This difference in attainment rates masks two very different trends in degree production for women and men. First, the rate for men has increased because baccalaureate production has fallen off and master's degree production has risen very gradually. On the other hand, the rate for women has increased only marginally because degree production at both levels has risen, and production of master's degrees has outpaced that of baccalaureates.

Doctorate Attainment

At the doctorate level, median elapsed time between degrees is higher for women than men (9.1 years versus 8.4 years in 1990) (appendix B, table 47). However, the number of years between bachelor's and doctoral degree attainment has increased over the decade from 1980 to 1990 for all S&E doctorates—from 7.6 years to 8.6 years. This overall increase in the time it takes to earn an S&E doctorate is attributable to the increased time (1.1 years) reported to earn a degree in the sciences; elapsed time to an engineering Ph.D. has not increased as much (0.4 year) over the decade.

In 1990, the longest elapsed time (11.4 years) between baccalaureate award and completion of a Ph.D. for women was in computer science; it increased by more than 3 years from 1980 to 1990. The greatest increase for men was 2.4 years, for a doctorate in psychology; in 1990 the elapsed time was 10.1 years. For other science fields in 1990, the longest elapsed time between degrees was in the social sciences (12.1 years for women and 10.5 years for men), and the shortest was in the physical sciences (women, 6.9 years; men, 7.1 years). In engineering, median elapsed time to degree was lower for women (7.8 years) than for men (8.2 years).

Advanced Degree Production

Master's Degrees[30]

In 1989, women received 31 percent (20,746) of the master's degrees conferred in science and engineering (66,026), up from 26 percent (14,040 of 54,456 degrees) a decade earlier. Men received 45,262 master's degrees in 1989; this was a 12-percent increase over the number they received in 1979 (40,416) (appendix B, tables 48-50). By field, women accounted for 42 percent of science degrees and 13 percent of engineering degrees (table 2-4).

Table 2-4. Advanced degrees granted to women in science and engineering, by field: 1989

	Master's degrees		Doctorates	
Field	Number of women	Percentage of total	Number of women	Percentage of total
Total	20,764	31.4	6,008	27.8
Sciences, total	17,632	41.9	5,635	33.1
Physical	1,040	26.8	617	18.9
Mathematical	1,370	39.9	156	18.1
Computer	2,626	27.9	107	17.5
Earth, atmospheric and oceanographic	482	26.5	146	20.3
Agricultural/biological	3,581	42.5	1,762	33.9
Psychology	5,838	67.5	1,800	56.1
Social	2,695	41.5	1,047	33.3
Engineering, total	3,132	13.1	373	8.2
Aeronautical/astronautical	64	7.5	8	4.5
Chemical	229	17.3	80	11.3
Civil	445	13.5	55	10.2
Electrical	916	11.7	67	5.9
Industrial	358	19.6	18	11.2
Mechanical	326	8.8	29	3.8
Materials/metallurgy	181	22.2	44	11.6
Other	613	14.4	72	10.7

SOURCE: Appendix B, tables 48, 50, 52 and 54

---

[28] Data on median elapsed time between baccalaureate and doctorate are from the NSF's Survey of Earned Doctorates.

[29] Attainment rates were calculated with data from tables 38-40 and 48-50 in appendix B of this report.

[30] Data for master's degrees in science and engineering are from the U.S. Department of Education, National Center for Education Statistics' annual Survey of Earned Degrees; these have been grouped into science and engineering categories used by NSF. Therefore, these data may differ from those in reports published by the U.S. Department of Education.

The field distribution of women who earn master's degrees parallels that at the bachelor's degree level. Women were most likely to earn their degrees in psychology (28 percent), agricultural and biological sciences (17 percent), or the social sciences (13 percent) (based on appendix B, table 50). About 15 percent of the women were granted engineering degrees; these were concentrated in the electrical, civil, and industrial subfields. In contrast, almost 46 percent of the men earned engineering degrees; another 26 percent were granted degrees in either the life sciences or computer science (based on appendix B, table 49).

The growth in the number of S&E master's degrees earned by females between 1979 and 1989 far exceeded the growth for men (48 percent versus 12 percent). The greatest percentage increases for women were in computer science, astronomy, and engineering. The number of men earning degrees in science fields declined from 1979 to 1989 in all fields except earth, atmospheric, and oceanographic sciences, mathematics, and computer science. In the 6-year period from 1983 to 1989, the number of in S&E master's degrees for women increased at an average annual rate of 3 percent; for men the growth rate was 1 percent.

Doctorates [31]

Trends in degree production at the doctoral level do not differ substantially from those at either the bachelor's or master's degree levels. The representation of women earning doctorates in science and engineering fields has increased dramatically, rising from 21 percent (3,688 of 17,624 degrees) in 1979 to 28 percent (6,008 of 21,541 degrees) in 1989 (appendix B, tables 52 and 54).[32] By field, women accounted for a larger proportion of the Ph.D.'s in science (34 percent) than in engineering (8 percent) in 1989 (table 2-4).

About 60 percent of women earned their doctorates in psychology (30 percent) or the agricultural and biological sciences (29 percent) in 1989 (based on appendix B, table 54). Only 6 percent earned engineering doctorates, most often in chemical and electrical specialties. The field distribution of men earning doctorates differs from this pattern: two-thirds earned doctorates in the agricultural and biological sciences (22 percent), physical science (17 percent), or engineering (27 percent; based on appendix B; tables 53).

The number of S&E doctorates granted to women increased by 63 percent between 1979 and 1989; the number awarded to men rose by only 12 percent. For women, above-average growth rates were experienced in engineering (up 502 percent, to 375 degrees) and computer science (up 296 percent, to 107 degrees). For men, computer science showed the most significant growth (176 percent) over the decade.

A different picture of S&E doctorate production emerges when the data are classified by citizenship. The slower overall growth among male doctorate recipients between 1980 and 1990 is largely the result of a decline in the number of male U.S. citizens earning these degrees (down by 11 percent from 1980 to 1990; based on appendix B; tables 55 and 56). In 1990, about one of every two male doctorate recipients was a U.S. citizen, down from three of four a decade earlier. The trend for women has been very different: the number of women earning S&E doctorates increased regardless of citizenship, although the number of women on temporary visas showed the most rapid growth. As a result of the growth in this group, the fraction of degrees awarded to women who were U.S. citizens had fallen to 74 percent in 1990, down from 86 percent in 1980.

Graduate Support Status

Of U.S. citizens who received a doctorate in a science or engineering field in 1990 and reported a primary source of support, both women and men reported universities more often than any other source (chart 2-8). A smaller proportion of women than of men reported this source, however (47 percent versus 58 percent). Among nonacademic sources of funding, women (40 percent) were more likely than men (28 percent) to rely on personal or family resources. Federal support was reported as the primary source of support by 10 percent of the women and 9 percent of the men.

National Science Foundation Fellowships[33]

Between 1975 and 1990, the representation of women in NSF's Graduate Fellowship Program rose substantially. In fiscal year (FY) 1990, women accounted for 42 percent (2,680) of all fellowship applicants, up from 31 percent (1,778) in FY 1975 and 37 percent (1,614) in FY 1985. In terms of the number of new awards offered, women's representation also increased—42 percent (357) in FY 1990, up from 27 percent (146) in FY 1975 and 33 percent (178) in FY 1985 (appendix B; tables 64-66).

Fellowship applications and award representation vary considerably by field. In FY 1990, women accounted for 33 percent of the applicants and 36 percent of the new awards granted in all engineering, mathematics, and physical science fields combined. However, they represented 52 percent of applicants and 49 percent of new award recipients in the behavioral and social science fields. In the life and medical sciences, the proportion of women who received new awards (53 percent) was similar to their share of applicants (54 percent).

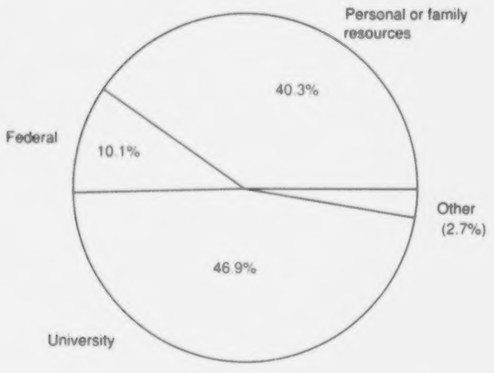
---

[31] Data on science and engineering doctorates granted in the United States are from the Survey of Earned Doctorates, conducted annually for NSF by the National Academy of Sciences.

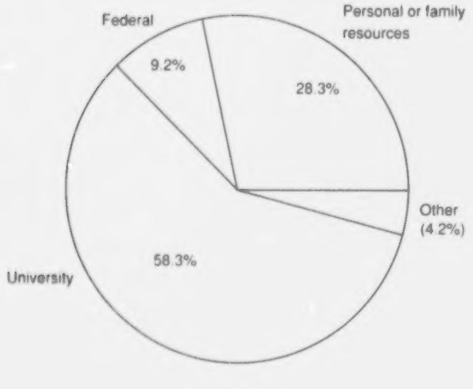
[32] These figures will differ from those presented by citizenship status. The classification used for bachelor's and master's degrees does not include as many subfields in the general field categories, which results in fewer degrees being reported.

[33] Data on this topic are from the NSF's Fellowship Program, collected by the National Academy of Sciences in support of NSF programs.

Chart 2-8. Major sources of support for 1990 U.S. Citizen S/E doctorate recipients, by sex



Women



Men

NOTE: Calculations include only those who reported a major source of support.
SOURCE: Based on appendix B, table 63

POSTDOCTORAL APPOINTMENTS[34]

The number of women holding S&E postdoctoral appointments has risen along with the growth in the number of women earning science and engineering Ph.D.'s. Although doctorate production rose by 63 percent in the last 10 years, the number of women holding postdoctorates increased by 92 percent between 1979 and 1989.[35] In 1989 about 4,200 postdoctoral appointments in science and engineering were held by women; this number represented 29 percent of all such appointments (appendix B, table 70). In comparison, women accounted for 21 percent of S&E postdoctoral appointments in 1979.

---

[34] Data in this section are from the NSF's Survey of Doctorate Recipients, conducted biennially for NSF by the National Academy of Sciences.

[35] Figures for 1979 are from National Science Foundation, Characteristics of Doctoral Scientists and Engineers in the United States: 1979, NSF 80-323, Surveys of Science Resources series, detailed statistical tables, 1980, p. 18.

SECTION II

Minorities

chapter 3

minorities in science and engineering

Overview 29

Blacks in Science and Engineering 30
  Employment Levels and Trends 30
  Field 30
  Experience 31
  Career Patterns 31
  Labor Market Indicators 31

Asians in Science and Engineering 32
  Employment Levels and Trends 32
  Field 33
  Experience 33
  Career Patterns 33
  Labor Market Indicators 34

Native Americans in Science and Engineering . . 34
  Employment Levels and Trends 34
  Field 35
  Experience 35
  Career Patterns 35
  Labor Market Indicators 35

Hispanics in Science and Engineering 36
  Employment Levels and Trends 36
  Field 36
  Experience 37
  Career Patterns 37
  Labor Market Indicators 37

chapter 4

education and training of minorities in science and engineering

Overview 39

Blacks 39
  Precollege Preparation 39
  Undergraduate Education 42
  Graduate Education 44
  Postdoctoral Appointments 46

Asians 46
  Precollege Preparation 46
  Undergraduate Education 47
  Graduate Education 49
  Postdoctoral Appointments 51

Native Americans 51
  Precollege Preparation 51
  Undergraduate Education 52
  Graduate Education 53
  Postdoctoral Appointments 53

Hispanics 54
  Precollege Preparation 54
  Undergraduate Education 56
  Graduate Education 58
  Postdoctoral Appointments 59

chapter 3

minorities in science and engineering

OVERVIEW

In relation to their representation in the overall U.S. work force in 1988, both blacks and Hispanics remained underrepresented in science and engineering. Asians are not underrepresented, and the proportion of Native Americans among scientists and engineers is roughly equal to their representation in the total U.S. labor force.

The 139,200 black scientists and engineers employed in 1988 constituted 2.6 percent of all scientists and engineers, up from 1.8 percent in 1978. However, blacks accounted for 10 percent of total U.S. employment in 1988, and almost 7 percent of all employed professional specialty workers. Asians represented about 5 percent (268,100) of all scientists and engineers, but only about 2 percent of the U.S. labor force. There were about 21,900 Native American scientists and engineers in 1988, accounting for less than 1 percent of total science and engineering (S&E) employment; this proportion was roughly similar to their representation in the overall U.S. work force. In 1988, about 1.8 percent (95,900) of all employed scientists and engineers were Hispanic; the Hispanic shares of all employed persons and those in professional specialty occupations were 7 percent and 3 percent, respectively. Hispanic representation in the work force remained at these levels in 1990.

Over the decade from 1978 to 1988, employment of black scientists and engineers increased about twice as rapidly as did employment of whites—192 percent (11 percent per year) versus 97 percent (7 percent per year). Employment of Asians rose by 146 percent (9 percent per year).

Racial/ethnic groups differ with respect to field distributions. The proportions in engineering ranged from about 56 percent of Asians to 32 percent of blacks; in contrast, about 52 percent of whites were engineers. In the sciences, blacks are more likely than others to be social scientists and psychologists, and Asians are least likely to be in those fields.

Asians—and, to a lesser extent, Hispanics—are less likely than other scientists and engineers to report management or administration as their primary work activity. For example, 22 percent of Asians and 28 percent of Hispanics cited management as their major activity in 1986. Blacks (31 percent) and Native Americans (30 percent) were just as likely as whites (30 percent) to hold management positions.

On average, black and Hispanic scientists and engineers earn salaries below those earned either by whites or by all scientists and engineers combined. In contrast, Asians and Native Americans report salaries equal to or greater than those for whites. Salaries for blacks averaged 81 percent of those for whites in 1986 Hispanics earned amounts equal to 90 percent of the average salaries paid across all racial/ethnic groups.

Whites tended to earn more than members of minority groups, regardless of educational level, with one exception. Asians who received bachelor's degrees in 1988 or 1989 earned salaries that were 15 percent higher than those of whites who received degrees in S&E fields; at the doctorate level, Asians with one year or less of professional experience earned 6 percent more than whites with a similar experience. In 1990 blacks who had received bachelor's degrees in 1988 or 1989 earned salaries equal to 92 percent of the salaries of their white colleagues; blacks who received master's degrees earned salaries that were 93 percent. At the doctorate level, the salaries of black Ph.D.'s with one year or less of professional experience were equal to 95 percent of the salaries earned by white Ph.D.'s with comparable experience.

Minorities generally are more likely than majority scientists and engineers to be unemployed and underemployed. For example, unemployment among black scientists and engineers in 1986 averaged 3.8 percent; for whites and Asians, the unemployment rates were 1.5 percent and 1.8 percent, respectively. Almost 6 percent of blacks reported that they were underemployed in 1986, as did 2.5 percent of whites and 2.2 percent of Asians.

This pattern was also true in 1990 for recent college graduates with bachelor's and master's degrees. Blacks with bachelor's degrees had an unemployment rate of 6.4 percent, and those with master's degrees, 4.6 percent. Comparable unemployment rates for whites were 3.0 percent and 1.6 percent; rates for Asians were 5.6 percent and 3.3 percent. Furthermore, the unemployment rate of black Ph.D.'s (3.7 percent) was more than four times the rate for whites (0.8 percent) and Asians (0.7 percent). Employed black Ph.D.'s were also more likely to be underemployed (2.9 percent) than were whites (1.3 percent) and Asians (0.9 percent).

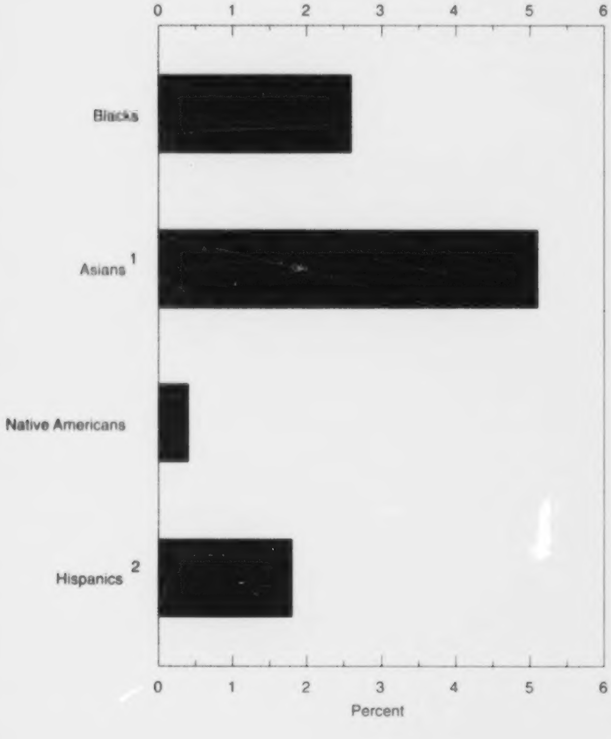
BLACKS IN SCIENCE AND ENGINEERING

Employment Levels and Trends

Blacks remain underrepresented in science and engineering despite significant employment gains over the past decade. Over the decade from 1978 to 1988, employment of black scientists and engineers increased roughly twice as fast as employment of their white counterparts—192 percent (11 percent per year) versus 97 percent (7 percent per year) (based on appendix B, table 1).

In 1988, the 139,200 employed black scientists and engineers represented 2.6 percent of all employed scientists and engineers, up from 1.8 percent (47,700) in 1978 (chart 3-1). Blacks in 1988 represented about 10 percent of total U.S. employment and 6.7 percent of those employed in professional specialty occupations.[1] In 1990 blacks continued to account for 10 percent of the total U.S. employment and 6.7 percent of those in employed in professional specialty occupations.[2]

Chart 3-1. Minorities as a percentage of employed scientists and engineers: 1988



1 About one-quarter of Asian scientists and engineers were not U.S. citizens.

2 Includes members of all racial groups

SOURCE: Based on appendix B, table 1

Blacks also remain underrepresented in the doctoral S&E work force. Over the decade from 1979 to 1989, employment of black Ph.D.'s increased by 122 percent (8 percent per year), while white employment rose by 39 percent (slightly over 3 percent per year). In 1989, about 1.6 percent (7,190) of the doctoral S&E work force was black, up from about 1 percent (3,235) in 1979 (appendix B, table 3).

Among scientists and engineers at all degree levels in 1988, twice as many blacks as whites were non-U.S. citizens (3 percent versus 1.5 percent). At the doctoral level in 1989, approximately 14 percent of blacks and 3 percent of whites were non-U.S. citizens.[3]

Field

By field, the representation of blacks in 1988 ranged from roughly 6 percent of mathematical and social scientists to about 1 percent of environmental scientists (based on appendix B, table 1). Among doctoral scientists and engineers in 1989, black representation ranged from 3.0 percent of social scientists to about 1 percent of physical and mathematical scientists (based on appendix B, table 3).

Blacks remain more likely than whites to be scientists rather than engineers. In 1988, 68 percent of employed black scientists and engineers were scientists, compared with 48 percent of whites. Within science fields, blacks were most likely to be social scientists or computer specialists (chart 3-2). In fact, over the decade from 1978 to 1988, the most rapid employment gains for black scientists occurred among computer specialists (up 23 percent per year) and social scientists (up about 16 percent annually). In comparison, annual employment of whites in these fields rose by 14 percent and 10 percent, respectively.

An index of dissimilarity[4] can be used to summarize general field differences of various groups. The index between whites and blacks was 24 in 1988; that is, about 24 percent of blacks would have to change fields to have a distribution identical to that of whites.

Among doctoral scientists and engineers, a higher proportion of blacks (91 percent) than whites (85 percent) were scientists rather than engineers in 1989 (based on appendix B, table 3).

---

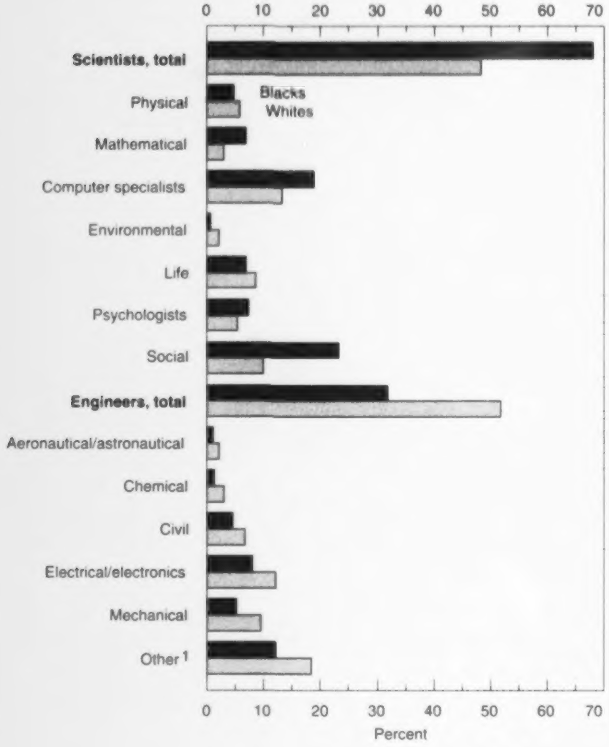
[1] U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, vol. 34, no. 1 (Washington, DC: U.S. Government Printing Office, January 1987), p. 179.

[2] U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, vol. 38, no. 1 (Washington, DC: U.S. Government Printing Office, January 1991, p. 185.

[3] National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, 1989, unpublished tabulations, table B-67.

[4] U.S. Commission on Civil Rights, Social Indicators of Equality for Minorities and Women (Washington, DC: U.S. Government Printing Office, August 1978), p. 44. The index of dissimilarity is calculated by taking the difference between two percentage distributions (one for each group, and each totaling 100 percent) covering the same occupation. The sum of the absolute (disregarding the sign) difference for all occupations is divided by two and the result is the index of dissimilarity. The index...represents the percentage of a group who would have to change occupations in order for the group to have the identical distribution of a comparison group. If two groups had the same distribution of occupations, the index of dissimilarity would be 0.0."

Chart 3-2. Field distribution of employed black and white scientists and engineers: 1988



[1] Includes industrial, materials, mining, nuclear, petroleum, and other

SOURCE: Based on appendix B, table 1

Almost one-half of all blacks were social scientists (29 percent) or psychologists (19 percent). In contrast, 16 percent of whites were social scientists and 15 percent were psychologists. The index of dissimilarity between black and white doctoral scientists and engineers in 1989 was 40: 17 for scientists and 23 for engineers.

Experience

In 1986, blacks had fewer years of professional experience than whites. Almost 40 percent of black scientists and engineers, compared with about 29 percent of whites, had fewer than 10 years of work experience (based on appendix B, table 6). Black doctoral scientists and engineers in 1989 also had fewer years of professional experience than whites (appendix B, table 9). Almost 50 percent of blacks with doctorates had fewer than 10 years of professional experience, whereas only 34 percent of whites had similar levels of professional experience.

Career Patterns

In 1986, blacks and whites were equally likely to report management as their primary work activity. Roughly 28 percent of each racial group was engaged in some aspect of management. There were, however, some differences between scientists and engineers. Among scientists, 30 percent of blacks and 25 percent of whites were in management; for engineers, the proportions were reversed—26 percent of blacks and 31 percent of whites.[5]

Blacks constitute approximately 2 percent of the doctoral scientists and engineers employed in 4-year colleges and universities. Once employed, they are less likely than their white colleagues to hold tenure or to become full professors. In 1989, 49 percent of blacks and 56 percent of whites held tenure (based on appendix B, table 15). More blacks (11 percent) than whites (9 percent) were in non-tenure-track positions. In 1989, only 27 percent of blacks—but 42 percent of whites—were full professors (based on appendix B, table 18). In contrast, 33 percent of blacks and 23 percent of whites were associate professors.

Labor Market Indicators

Black scientists report labor force experiences that are different from those of whites. Although blacks are slightly more likely than whites to be in the labor force, they are also more likely to be unemployed and underemployed.

In 1986, black scientists and engineers had a labor force participation rate of 97 percent; for whites, this rate was 94 percent. At this time, the participation rate for black scientists and engineers was much higher than that for blacks in the overall population (64 percent) or for black college graduates (87 percent) (appendix B, table 21).[6]

In 1990, black S&E bachelor's degree recipients who had received their degrees in 1988 or 1989 had a labor force participation rate of 97 percent (appendix B, table 23). The rate was 98 percent for black recent master's degree recipients in 1990 (appendix B, table 23) and for blacks in 1989 who had received their doctorates between 1946 and 1988 (appendix B, table 22). Participation rates for white recent graduates were about 97 percent for bachelor's and master's degree recipients and 93 percent for doctorate recipients.

Once in the labor force, blacks are more likely than whites to be unemployed. The unemployment rate for black scientists and engineers averaged 3.8 percent in 1986; this was more than twice the 1.5-percent rate for whites (appendix B, table 21).[7] The unemployment rate for black scientists and engineers had, however, declined from 5.9 percent in 1976.[8] In the overall U.S. work force in 1986, the unemployment rate for blacks was 11.5 percent[9] and the rate for black college graduates was 3.6 percent.[10]

---

[5] National Science Foundation, Women and Minorities in Science and Engineering, NSF-90-301, January 1990, p. 29.

[6] Women and Minorities, p. 29.

[7] Women and Minorities, p. 29.

[8] Women and Minorities, p. 29.

The unemployment rate for black doctoral scientists and engineers was 3.7 percent in 1989, versus 0.8 percent for whites (table 3-1). In 1990, unemployment rates for black recent college graduates with bachelor's and master's degrees were 6.4 percent and 4.6 percent, respectively. At 3.0 percent for recent baccalaureate recipients and 1.6 percent for master's degree recipients, whites had unemployment rates that were less than one-half the rates for blacks. The employment outlook improved for blacks over the decade. In 1980, black recent (1978 and 1979) graduates with bachelor's degrees had an unemployment rate of 9.3 percent and those with master's degrees a rate of 12.8 percent. The comparable rates for whites were 3.3 percent and 2.0 percent, respectively.[11]

Table 3-1. Selected characteristics of employed persons with degrees in science and engineering, by degree level

Characteristics/ degree level (1)	White	Black	Asian	Native American	Hispanic (2)
Unemployment rate					
Bachelor's	3.0	6.4	5.6	1.5	4.4
Master's	1.6	4.6	3.3	--	4.3
Doctorate	0.8	3.7	0.7	1.5	0.8
S&E underemployment rate					
Doctorate	1.3	2.9	0.9	1.6	1.4
Median annual salary					
Bachelor's	$26,100	$24,000	$30,000	$21,900	$25,100
Master's	37,500	35,000	35,900	--	36,100
Doctorate	54,800	48,500	55,000	50,100	50,000

Double dashes (--) represent too few cases to estimate.
(1) Data for bachelor's and master's degrees were reported in 1990 by 1988 and 1989 graduates; data for doctorates were reported in 1989 by recipients who received degrees between 1946 and 1988.
(2) Includes members of all racial groups
SOURCE: Appendix B, tables 22, 23, 25, and 26

Black scientists and engineers also experience higher rates of underemployment than do whites. In 1986, the rate for blacks was 5.5 percent, compared with 2.5 percent for whites (appendix B, table 21).[12] This higher rate is primarily the result of greater underemployment of blacks in science fields (7.5 percent, versus 4.2 percent for whites). Across these fields, black social scientists had the highest underemployment rate (13 percent). On the other hand, underemployment rates among engineers averaged only 2 percent for blacks and 1 percent for whites. In 1989, the underemployment rate for black doctoral scientists and engineers (2.9 percent) was more than double the rate for white doctorate holders in the same fields (1.3 percent) (table 3-1).

In 1986, black scientists and engineers earned annual salaries that were equal to 81 percent of those for whites—a difference of $7,200 (based on appendix B, table 24). Salaries were $31,500 for blacks and $38,700 for whites. Annual salaries for blacks were lower than those for whites across all major S&E fields. The greatest differential occurred in the social sciences, where salaries for blacks ($22,800) were equal to about 71 percent of those for whites.[13] Black doctoral scientists and engineers earned annual median salaries of about $48,500 per year in 1989; this figure was approximately 89 percent of the median salary for white doctoral scientists and engineers ($54,800) (appendix B, table 25). Although salaries for black Ph.D.'s continue to be lower than those of white Ph.D.'s, regardless of experience level, the difference in salaries decreases along with the number of years of professional experience. For example, in 1989, black Ph.D.'s with up to 1 year of professional experience earned salaries ($36,400) equal to 95 percent of the salaries of white Ph.D.'s with the same level of experience ($38,400); blacks with 10 to 14 years' experience earned amounts ($51,100) equal to 97 percent of the salaries of whites with similar experience ($52,600) (appendix B, table 72).

In 1990, black recent college graduates (those who received degrees in 1988 or 1989) with bachelor's degrees in science and engineering earned median salaries that were equal to 92 percent of the median salaries for whites ($24,000 versus $26,100) (appendix B, table 26). The median salaries of blacks who had recently received master's degrees ($35,000) were equal to 93 percent of the median salaries earned by whites ($37,500).

ASIANS IN SCIENCE AND ENGINEERING

Employment Levels and Trends

Between 1978 and 1988, employment of Asian scientists and engineers increased faster than did employment of whites—146 percent (9 percent per year) versus 97 percent (7 percent per year) (appendix B, table 1). In 1988, the approximately 268,000 Asian scientists and engineers accounted for about 5 percent of the total S&E work force. In contrast, Asians constitute only about 2 percent of the overall U.S. work force and only 3 percent of those in professional fields.[14]

Over the decade from 1979 to 1989, employment gains by Asian doctoral scientists and engineers outpaced those by whites. Employment of Asians rose by 80 percent (6 percent per year) over the decade, while that of whites increased by only about 39 percent (slightly over 3 percent per year) (based on appendix B, table 3). In addition, Asian representation among doctoral scientists and engineers is higher than their representation among all scientists and engineers. In 1989, 9.2 percent (41,239) of employed doctoral scientists and engineers were Asian, up from 7.3 percent (22,932) in 1979. Asians constituted 7 percent of the employed doctoral scientists and 20 percent of the engineers.

---

[9] Employment and Earnings, vol. 38, p. 54.

[10] U.S. Department of Labor, Bureau of Labor Statistics, unpublished tabulations.

[11] National Science Foundation, Division of Science Resources Studies, 1980 New Entrants Survey, unpublished tabulations, table B-51.

[12] Women and Minorities, p. 29.

[13] Women and Minorities, p. 29.

[14] U.S. Bureau of the Census, General Social and Economic Characteristics, United States Summary, 1980 Census of the Population (Washington, DC: U.S. Government Printing Office, 1983).

Among doctoral scientists and engineers employed in 1989, roughly 68 percent of Asians—compared with 97 percent of whites—were U.S. citizens. Of those who were U.S. citizens, about 15 percent of Asians but 93 percent of whites were native-born.[15]

Field

Asians are somewhat more likely than whites to be engineers rather than scientists. About 56 percent of Asians and 52 percent of whites in science and engineering were engineers in 1988. Asian scientists are most likely to be computer specialists and least likely to be environmental scientists (chart 3-3). The index of dissimilarity between Asians and whites was 16 in 1988; that is, 16 percent of Asians would have to change fields to have a distribution similar to that for whites.

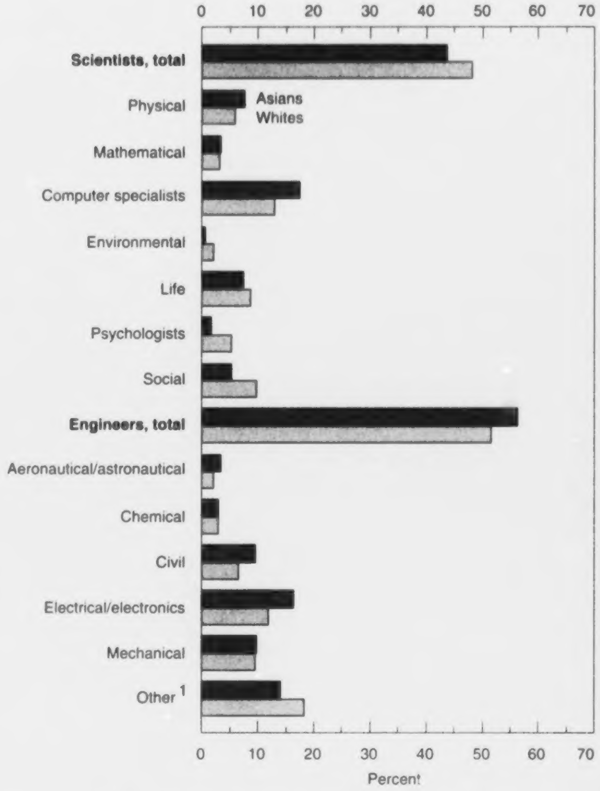
Over the decade from 1978 to 1988, employment of Asian scientists increased more rapidly than did that of Asian engineers (12 percent versus 8 percent per year) (based on appendix B, table 1). For whites, employment of engineers rose at an annual rate of almost 6 percent and that of scientists increased at a 9-percent rate. Among Asian scientists, the fastest growing fields were computer specialties (up about 19 percent per year, to almost 50,000) and the mathematical sciences (up about 20 percent per year, to 9,200).

The field distribution of Asian doctoral scientists and engineers differs from that of whites. Only 65 percent of Asians, but 86 percent of whites, were scientists rather than engineers in 1989 (based on appendix B, table 3). Of the Asian doctoral scientists, more than 60 percent were either life scientists (35 percent) or physical scientists (27 percent). The employment of Asian scientists and engineers increased over the decade from 1979 to 1989 at about the same rate (6 percent). For whites, employment increases among scientists and engineers were 3.3 percent and 3.5 percent, respectively. The index of dissimilarity between Asian and white doctoral scientists and engineers was 29 in 1989—19 percent for scientists and 10 percent for engineers.

Experience

Asian and white scientists and engineers reported a similar number of years of professional experience in 1986. For example, over 30 percent of both whites and Asians had fewer than 10 years' work experience (based on appendix B, table 6). Among doctoral scientists and engineers in 1989, Asians had fewer years of experience, on average, than did whites. About 43 percent of Asian Ph.D.'s had fewer than 10 years of professional experience; the comparable figure for whites was about 34 percent (based on appendix B, table 9).

Chart 3-3. Field distribution of employed Asian and white scientists and engineers: 1988



[1] Includes industrial, materials, mining, nuclear, petroleum, and other

SOURCE: Based on appendix B, table 1

Career Patterns

Asians are less likely than whites to be in management. About 28 percent of whites, but only 22 percent of Asians, reported management as their major work activity.

The tenure status and academic rank of Asian scientists and engineers also differ from those of whites. Among doctoral scientists and engineers in 4-year colleges and universities, Asians are less likely than whites to hold tenure: In 1989, roughly 43 percent of Asians, compared with 56 percent of whites, held tenure (based on appendix B, table 15). A higher proportion of Asians (12 percent) than whites (9 percent) were in non-tenure-track positions.

Asians and whites also show some differences in measures of academic rank. Among doctorate holders in 1989, 35 percent of Asians and 42 percent of whites were full professors; at the associate level, the proportion was 19 percent for Asians and 23 percent for whites (based on appendix B, table 18).

---

[15] Survey of Doctorate Recipients, 1989, unpublished tabulations, table B-67.

Labor Market Indicators

Labor market conditions are roughly the same for both Asian and white scientists and engineers. Asians were slightly more likely than whites to be in the labor force in 1986; however, they had a slightly higher unemployment rate.

The 96-percent labor force participation rate for Asians in 1986 (the latest year for which data are available) was slightly above that for whites (94 percent) (appendix B, table 21).[16] The rate for Asians, however, had fallen since 1976, when it was 99 percent. In the overall U.S. population, Asians had a labor force participation rate of roughly 70 percent.[17]

The 1990 labor force participation rate for Asians who had received bachelor's and master's degrees in science and engineering in 1988 and 1989 was 96 percent (appendix B, table 23). White recent bachelor's and master's degree recipients had slightly higher rates (over 97 percent). The participation rate for Asian doctoral scientists and engineers, 97 percent, was higher than the 93-percent rate for whites (appendix B, table 22).

Among doctoral scientists and engineers, the unemployment rate for Asians in 1989 was about the same as that of whites, roughly 1.0 percent (table 3-1). Asian recent bachelor's and master's degree recipients had higher rates of unemployment than did whites. Asians with S&E bachelor's degrees had a rate of 5.6, versus 3.0 percent for whites; the rate for master's degree recipients was 3.3 percent, versus 1.6 percent for whites.

Only 2.2 percent of Asian scientists and engineers were underemployed in 1986 (appendix B, table 21). The corresponding rate for whites was 2.5 percent. The S&E underemployment rate for Asians varied by field; for example, Asian scientists had a rate of 3.5 percent, and Asian engineers had a rate of 1.2 percent. Asian doctorate holders in 1989 had an underemployment rate of about 1 percent, whereas whites had a slightly higher rate of 1.3 percent (appendix B, table 22).

Asian and white scientists and engineers earned roughly similar salaries in 1986—$39,100 for Asians and $38,700 for whites (appendix B, table 24). Although Asian and white engineers earned approximately equal salaries, among scientists, Asians' salaries averaged 103 percent of those for whites.

Asians who earned bachelor's degrees in S&E fields in 1988 and 1989 had median annual salaries of $30,000 in 1990 (appendix B, table 26). This was 115 percent of the median salaries for whites ($26,100) in the same S&E fields. This difference between Asian and white median salaries can be attributed largely to the higher salaries of Asians with bachelor's degrees in science fields. Asians with bachelor's degrees in science earned median salaries of $27,900, versus $23,000 for whites; median salaries for Asian and white graduates with bachelor's degrees in engineering were almost equal—$32,800 for Asians and $33,300 for whites.

Asian graduates with master's degrees earned median annual salaries of $35,900, equal to 96 percent of the median salary earned by whites ($37,500). At the Ph.D. level in 1989, median salaries for Asians ($55,000) were slightly higher than those of whites ($54,800) (appendix B, table 25).

As the years of professional experience increased for Asian S&E doctorate holders, so did the difference in their salaries relative to those of white S&E doctorate holders. For example, in 1989 Asians with up to 1 year of professional experience made, on the average, 6 percent more than whites; those with 2 to 4 years, 8 percent more; and those with 5 to 9 years, 10 percent more (appendix B, table 72).

NATIVE AMERICANS IN SCIENCE AND ENGINEERING

Data for Native Americans should be viewed with some caution, because sample sizes for Native Americans are very small; statistical reliability is thus lower for data on Native Americans than for data on other groups.[18] In addition, for Native Americans, estimates both for scientists and engineers and for the overall U.S. labor force are based on self-reported data. Individuals' willingness to report themselves as Native Americans may have varied over time.

Employment Levels and Trends

In 1988, the approximately 22,000 employed Native American scientists and engineers represented less than 1 percent of the S&E work force (appendix B, table 1). This percentage was similar to their representation both in the overall U.S. work force and in professional specialty fields.[19]

There are relatively few Native Americans in the doctoral S&E work force. In 1989, about 780 doctoral scientists and engineers were Native American, up from about 400 in 1979 (appendix B, table 3).

---

[16] Women and Minorities, p. 31.

[17] Women and Minorities, p. 31.

[18] See appendix A, "Technical Notes," for a discussion of the statistical reliability of the estimates of scientists and engineers.

[19] Women and Minorities, p. 31.

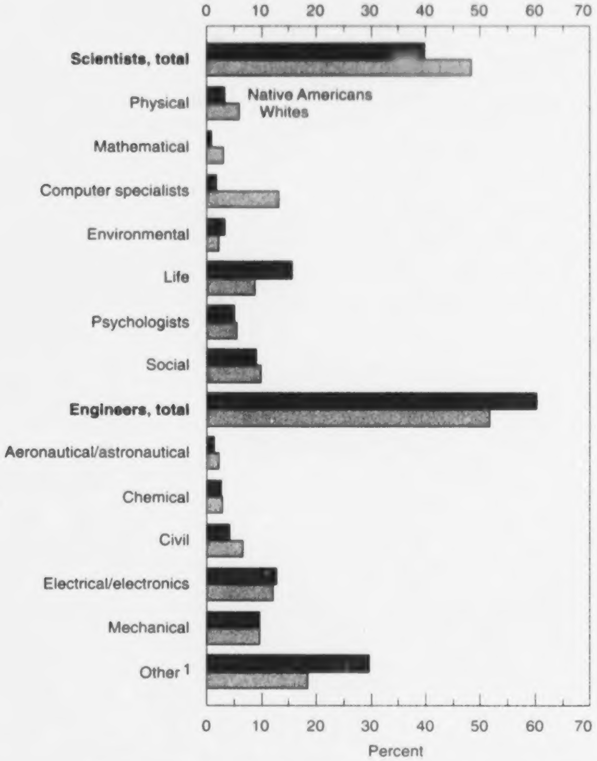
Field

There are certain differences in the field distributions of Native Americans and whites (chart 3-4). For example, Native Americans are somewhat more likely than whites to be engineers rather than scientists. In 1988, 60 percent of Native Americans and 52 percent of whites were engineers. On the other hand, Native American doctoral scientists and engineers were more highly concentrated in the sciences than in engineering in 1989 (89 percent versus 11 percent) (based on appendix B, table 3). This field distribution has changed somewhat since 1979, when 92 percent of Native Americans with doctorates were scientists. Within the sciences in 1989, half the Native American Ph.D.'s were either life scientists (26 percent) or social scientists (24 percent).

Experience

In 1986 Native Americans, on average, reported more years of professional experience than did whites. About 20 percent of Native Americans—compared with 30 percent of whites—reported less than 10 years' work experience (based on appendix B, table 6).[20] In 1989, over 48 percent of employed Native American doctoral scientists and engineers reported fewer than 10 years of professional work experience, compared with 34 percent for whites (based on appendix B, table 9).

Chart 3-4. Field distribution of employed Native American and white scientists and engineers: 1988



[1] Includes industrial, materials, mining, nuclear, petroleum, and other

SOURCE: Based on appendix B, table 1

Career Patterns

Native Americans represent less than 1 percent of all doctoral scientists and engineers employed in 4-year colleges and universities. At the colleges and universities, Native Americans are less likely (49 percent) than whites (56 percent) to hold tenure (based on appendix B, table 15). About 32 percent of Native Americans and 42 percent of whites were full professors in 1989; 28 percent of Native Americans and 23 percent of whites were at the associate professor level (based on appendix B, table 18).

Labor Market Indicators

Native American scientists and engineers generally experience favorable labor market conditions. In 1986, they were more likely than whites to be in the labor force and less likely to be unemployed or underemployed.[21]

In 1986, Native American scientists and engineers had a labor force participation rate of 96 percent; for whites, the rate was 94 percent (appendix B, table 21). Among those in the labor force, 1.2 percent of Native Americans and 1.5 percent of whites were unemployed.

In 1990, recent Native American S&E graduates (those who had received bachelor's and master's degrees in 1988 and 1989) had a labor force participation rate of 100 percent (appendix B, table 23). The comparable rate for whites was 97 percent. Among Native American Ph.D.'s in 1989, the labor force participation rate was 95 percent, compared with 93 percent for whites (appendix B, table 22). The underemployment rate for Native American Ph.D.'s was 1.6 percent; the rate for whites was 1.3 percent.

Data on annual salaries contrast with other indicators, showing less favorable labor market conditions for Native Americans than for whites. In 1989, Native American recent bachelor's degree recipients earned a median annual salary that was 84 percent of that of whites ($21,900, compared with $26,100 for whites) (table 3-1). At the doctoral level, the median annual salary reported by Native Americans in 1989 was $50,100, which was 91 percent of the median salary for whites ($54,800).

---

[20] Women and Minorities, p. 32.

[21] Women and Minorities, p. 32.

HISPANICS IN SCIENCE AND ENGINEERING

It is desirable to differentiate among Mexican Americans, Puerto Ricans, and other Hispanics, because socioeconomic backgrounds and reasons for underrepresentation may vary among these groups. Because of data limitations, however, most of this discussion treats Hispanics in the aggregate.

In 1988, about 29 percent of employed Hispanic scientists and engineers were Mexican American and 12 percent were Puerto Rican. The remaining 59 percent were "other Hispanic" (53 percent) or did not report their specific Hispanic origins (6 percent).[22] In the total U.S. work force in 1988, about 57 percent of Hispanics were Mexican American and 10 percent were Puerto Rican.[23] In 1990, about 62 percent of Hispanics in the overall U.S. work force were Mexican American, 9 percent were Puerto Rican, and 6 percent were Cuban.[24]

Employment Levels and Trends

Hispanics remain underrepresented in science and engineering. The approximately 96,000 Hispanic scientists and engineers employed in 1988 represented only 1.8 percent of all scientists and engineers (based on appendix B, table 1). In comparison, roughly 7.2 percent of all employed persons in the United States in 1988 were Hispanics, as were 3.4 percent of those in professional and related occupations. About 11 percent of Hispanic scientists and engineers were non-U.S. citizens; the comparable figure for all scientists and engineers was about 3 percent. Among all Hispanics in the United States, about 20 percent were not U.S. citizens.[25]

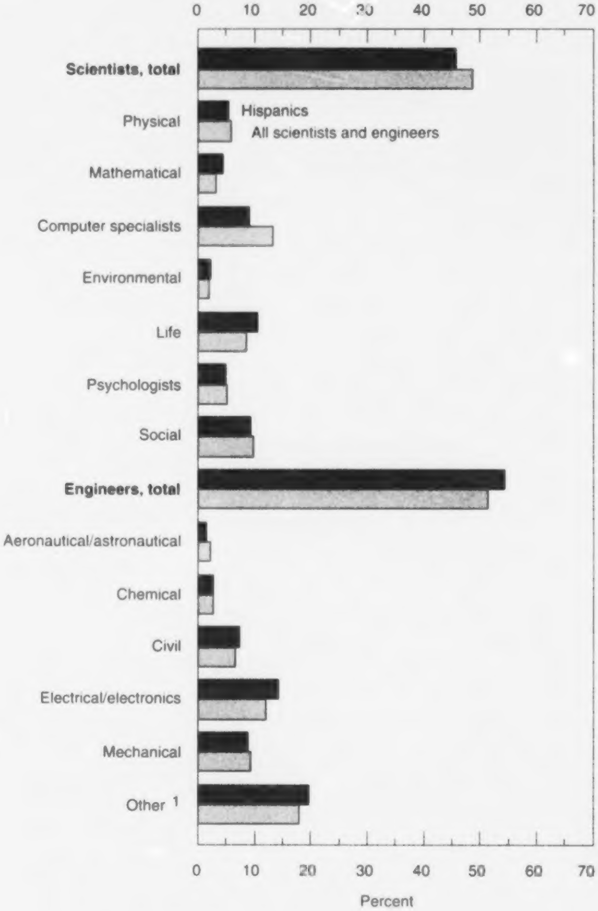
In 1990, Hispanics' representation in the U.S. labor force had increased slightly from its 1988 level, to 7.7 percent,[26] but the proportion of Hispanic workers in professional and other occupations had decreased to 3.3 percent.[27]

Hispanics are also underrepresented among doctoral scientists and engineers. In 1989, the 8,094 Hispanic doctoral scientists and engineers accounted for 1.8 percent of all doctoral scientists and engineers; their employment was up from 4,155 (1.3 percent) in 1979 (appendix B; table 3). Among Hispanic doctoral scientists and engineers, about 20 percent were not U.S. citizens in 1989; an additional 25 percent were foreign-born but held U.S. citizenship.[28]

Field

There are relatively small differences between the field distributions of Hispanic scientists and engineers and all scientists and engineers; the index of dissimilarity was only 11 in 1988. In 1988, about 54 percent of Hispanic scientists and engineers and 51 percent of all scientists and engineers were engineers (based on appendix B, table 1). Among fields, Hispanics are somewhat more likely to be life scientists and less likely to be computer specialists (chart 3-5). In 1989, Hispanic Ph.D.'s (16 percent) and all Ph.D.'s (17 percent) were about equally likely to be engineers (based on appendix B, table 3).

Chart 3-5. Field distribution of employed Hispanic and all scientists and engineers: 1988



[1] Includes industrial, materials, mining, nuclear, petroleum, and other

SOURCE: Based on appendix B, table 1

---

[22] The "other Hispanic" category includes individuals whose origins are in Spain or the Spanish-speaking countries of Central or South America. Also included in this category are those who identified themselves as Spanish, Spanish American, Hispano, Latino, etc.

[23] Employment and Earnings, vol. 34, p. 202.

[24] Employment and Earnings, vol. 38, p. 209.

[25] Women and Minorities, p. 32.

[26] Employment and Earnings, vol 38, p. 208.

[27] Employment and Earnings, vol. 38, p. 210.

[28] Survey of Doctorate Recipients, unpublished tabulations, table B-67.

Experience

In 1986, Hispanics reported significantly fewer years of professional experience than did all scientists and engineers. About 44 percent of Hispanics reported fewer than 10 years' experience; the comparable figure for all scientists and engineers was 31 percent (appendix B, table 6).[29] Among doctoral scientists and engineers in 1989, a higher proportion of Hispanics than of all scientists and engineers had fewer than 10 years of work experience (52 percent versus 35 percent) (based on appendix B, table 9).

Career Patterns

There is little difference between the proportions of Hispanic scientists and engineers and all scientists and engineers who report management as their primary activity. In 1986, these proportions were 26 percent and 28 percent, respectively.[30]

There are some notable differences within educational institutions between Hispanic and all doctoral scientists and engineers regarding tenure status and professional rank. In 1989, 41 percent of Hispanics and 55 percent of all scientists and engineers held tenure (appendix B, table 15). Among Hispanics, about 21 percent were full professors; the comparable figure for all doctoral scientists and engineers was 41 percent (based on appendix B, table 18).

Labor Market Indicators

Hispanic scientists and engineers faced labor market conditions that differed somewhat from those for all scientists and engineers in 1986. Although Hispanics were as likely as all scientists and engineers to be in the labor force, they were more likely to be unemployed and underemployed.

The labor force participation rate for both Hispanic scientists and engineers and all scientists and engineers was 95 percent in 1986 (appendix B, table 21). The participation of Hispanic scientists and engineers in the labor force was well above the 65-percent rate for the overall Hispanic population;[31] it was also significantly higher than the 84-percent rate for Hispanic college graduates.[32]

The unemployment rate for Hispanic scientists and engineers (2.1 percent) in 1986 was higher than that for all scientists and engineers (1.5 percent; appendix B, table 21). At the doctoral level, the unemployment rate for Hispanics was similar to that for all scientists and engineers—about 1 percent in 1989 (table 3-1). The unemployment rates in 1990 for recent Hispanic bachelor's and master's degree recipients (degree received in 1988 or 1989) were 4.4 percent and 4.3 percent, respectively. At both levels, the unemployment rate was higher than the rate for all S&E graduates, which was 3.4 percent for those with bachelor's degrees and 1.8 percent for master's degrees (appendix B, table 23).

Hispanic scientists and engineers, on average, experience a higher degree of underemployment than do all scientists and engineers (appendix B, table 21). The underemployment rate for Hispanics in 1986 was 4.8 percent, compared with 2.6 percent for all scientists and engineers. Among Ph.D.'s, the underemployment rate in 1989 was 1.4 percent for Hispanics and 1.3 percent for all scientists and engineers (table 3-1).

In 1986, salaries for Hispanic scientists and engineers averaged 90 percent of those earned by all scientists and engineers ($34,600 versus $38,400) (appendix B, table 24).[33] Annual median salaries for recent Hispanic S&E bachelor's degree recipients (degree received in 1988 or 1989) averaged 97 percent of those earned by all recent S&E bachelor's degree recipients ($25,100 versus $26,000) (table 3-1). The median salary for recent Hispanic graduates with bachelor's degrees in engineering was 98 percent of that for all recent recipients of engineering baccalaureates; for degrees in science, the salary ratio was 92 percent. Similarly, recent Hispanic S&E master's degree recipients earned 98 percent of the salaries earned by all S&E graduates with master's degrees. Hispanic doctoral scientists and engineers earned approximately 92 percent of the salaries for all doctoral scientists and engineers ($50,000 versus $54,600) in 1989.

---

[29] Women and Minorities, p. 32.

[30] Women and Minorities, p. 33.

[31] Women and Minorities, p. 201.

[32] U.S. Department of Labor, Bureau of Labor Statistics, unpublished tabulations.

[33] Women and Minorities, p. 33.

chapter 4

education and training of minorities in science and engineering

OVERVIEW

The educational experiences of minorities differ extensively from each other and from those of the majority. These differences show up early. For instance, compared with whites, blacks and Hispanics tend to take fewer courses in mathematics and science, and Asians take more of these courses. One indication of this lower participation for blacks and Hispanics is their performance on mathematics and science skills assessments. These groups score lower than average as early as age 9, and the greatest differences occur by age 17.

Differing rates of participation in mathematics and science training in elementary and secondary school are partially reflected in scores on the mathematics portion of the Scholastic Aptitude Test (SAT). Although scores for blacks and Hispanics are below average by roughly 40 to 90 points, scores for Asians are consistently higher than average by almost 50 points.

Progress is evident for minorities, nonetheless, especially for blacks. Between 1973 and 1990, scores on precollege assessments of mathematics and science skills have increased much more sharply for blacks than for the majority. In addition, the SAT mathematics scores of blacks have increased at above-average levels over the decade.

Differences in participation in mathematics and science may reflect several factors, one of which is opportunity. Minority groups, especially blacks and Hispanics, come from socioeconomic backgrounds that are very different from those of the majority. For example, family incomes reported by black and Hispanic freshmen are much lower than the overall average, and these students must rely heavily on grants and scholarships to finance their education. Furthermore, the average level of education is much lower for the parents of these students than for the parents of all students; parents of minority students are much less likely to hold an undergraduate degree. Finally, high school grade point averages (GPAs) are lower for minorities, especially for blacks. On a more positive note, however, these students plan to study to the graduate and professional level to a greater than average extent.

S&E bachelor's degree production has slowed nationally over the decade from 1979 to 1989. For minority groups this trend has translated into a decline in bachelor's degrees awarded to blacks, a small increase for Native Americans, and a modest increase (34 percent) for Hispanics. Asians, however, earned degrees at a much faster rate than did underrepresented minorities over this time period (178 percent increase).

Doctorate production in science and engineering has slowed for minorities among U.S. citizens. The number of doctorates awarded to black U.S. citizens has fallen over the decade, and the number awarded to Asians increased by 40 percent. The number of Hispanic U.S. citizens earning doctorates more than doubled.

BLACKS

Precollege Preparation[1]

Mathematics and Science Achievement [2]

Mathematics.[3] Blacks scored below whites at all three age levels (9, 13, and 17 years) on the mathematics assessment tests given in 1990. The 1990 scores follow the trend of scores for the previous 3 test years (1978, 1982, and 1986): The gap in scores has narrowed since 1973. Assessment scores in 1990 were closest for blacks and whites in the 17-year-old group, unlike in 1986, when the gap in scores was largest in this age group. In the 1973, 1978, and 1982 assessments, the largest average difference in performance by blacks and whites was at the 13-year-old level.

Nine-year-olds. On the most recent assessment (1990), the difference in overall mean scores for blacks and whites was about 27 points (208.4 versus 235.2). This difference has diminished since 1973—when it was almost 35 points—as a result of an increase in scores for blacks (up from 190.0 in 1973). For the past 5 test years, whites have scored an average of approximately 30 points more than blacks on each test.

---

[1] For explanations and definitions of the data sets and examinations used in this section, see chapter 2, "Education and Training of Women in Science and Engineering."

[2] The assessments conducted by the National Assessment of Educational Progress use a common scale of 0 to 500. Within this scale, proficiency in a subject is broken into five levels.

[3] Figures for mathematics assessments scores are taken from table 27 in appendix B of this report.

In 1990, there were differences in the levels of proficiency achieved by blacks and whites. A slightly lower percentage of blacks (97 percent) than whites (99 percent) scored at or above the lowest level, 150 (simple arithmetic facts). As the levels increase, so do the differences in percentages. Thus, only about 9 percent of blacks, compared with 33 percent of whites, scored at or above the 250 level (basic operations and problem solving).

Thirteen-year-olds. The variation in scores for blacks at this age was similar to that of 9-year-olds. An average of 27 points separated the overall means for blacks (249.1) and whites (276.3) in 1990. This gap has narrowed considerably since 1973, when it was 46 points. This is the result of an increase in scores of black 13-year-olds by an average of 21 points since 1973. Blacks have scored an average of 35 points lower than whites over the last five test periods.

Levels of proficiency continue to vary between blacks and whites. For example, about 49 percent of blacks, but 82 percent of whites, scored above the 250 level (basic operations and problem solving). The proportions scoring at or above level 300 (moderately complex procedures and reasoning) were 4 percent and 21 percent, respectively.

Seventeen-year-olds. The overall mean score for blacks in 1990 was 288.5, 21 points lower than that for whites (309.5). This gap has diminished substantially since 1973, when it was 40 points. Over the last five test periods, the mean scores of blacks have been an average of 32 points lower than those of whites.

All students in this age group, black and white, scored at or above the 200 level (beginning skills and understanding). As the levels of proficiency increased, so did the differences between the groups. The proportions scoring above 250 (basic operations and problem solving) were 92 percent for blacks and 98 percent for whites. The proportions scoring above 300 (moderately complex procedures and reasoning) were 33 percent and 63 percent, respectively. At the highest level, level 350 (multistep problem solving and algebra), 2 percent of black students and 8 percent of whites scored at or above proficiency.

Science.[4] The pattern of progress on the science assessment has been similar to that exhibited on the mathematics series (appendix B, table 27). The mean scores of blacks are lower than those for whites at all age levels, especially among 17-year-olds. Progress by blacks since 1973 has begun to close the gap, however.

Nine-year-olds. The overall mean score of blacks in 1990 was about 41 points lower than that of whites (196.4 versus 237.5). Since 1973, though, the mean score of blacks has risen from 176.5, which was 55 points lower than the mean score of whites (231.1). Over the last five test periods, blacks have scored an average of 46 points lower than whites.

Differences in levels of proficiency show up early and increase with proficiency level. In 1990, 88 percent of blacks, compared with 99 percent of whites, scored at or above the 150 level (knowledge of everyday facts). The proportions scoring at or above level 200 (understanding simple scientific principles) were 46 percent (blacks) and 84 percent (whites).

Thirteen-year-olds. Differences in scores have also narrowed for this age group. In 1973, blacks' average scores were 53 points lower than those of whites; in 1990, the difference was 38 points (225.7 versus 264.1). On the average, blacks scored 44 points lower than whites over the last five assessment periods.

For this age group, proficiency gaps begin to appear at the lowest levels. About 78 percent of blacks, compared with 97 percent of whites, scored at or above the 200 level (simple principles). For scores at or above the 250 level (application of basic scientific knowledge), the proportions were 24 percent and 67 percent, respectively.

Seventeen-year-olds. The largest difference in mean scores between blacks and whites was for this age group. In 1990, blacks scored 253.0, which was 48 points lower than the score of whites (300.9). In 1973, however, the difference was more than 53 points. The average difference between black and white assessment scores for the last five assessments was 52 points.

Substantial differences between blacks and whites exist at all levels of proficiency. These differences are most acute in the upper ranges. In 1990, roughly 16 percent of blacks and 51 percent of whites scored at or above the 300 level (analyses of procedures and data). Proportions scoring at or above the level 350 (integration of specialized scientific knowledge), the highest level, were 2 percent and 11 percent, respectively.

Characteristics of College-Bound Seniors

Coursework. Data for college-bound seniors who take the SAT show that about the same percentages of blacks and whites take introductory-level mathematics (algebra) and science (biology) courses in high school, but that wide disparities begin to emerge at more advanced levels (appendix B, table 29). In 1990, almost all seniors, both black (95 percent) and white (97 percent), had taken algebra, but more whites than blacks had taken geometry, trigonometry, or calculus. For example, 86 percent of blacks had taken geometry, 43 percent trigonometry, and 9 percent calculus; in comparison, 94 percent, 56 percent, and 19 percent of whites had taken geometry, trigonometry, and calculus, respectively. In addition, about 13 percent of blacks, compared with 24 percent of whites, had been enrolled in an honors math course.

Science coursework parallels this trend. Over 95 percent of both black (96 percent) and white (97 percent) students had taken biology, but 32 percent of blacks and 44 percent of whites reported having taken a physics course. Likewise, fewer blacks (13 percent) than whites (23 percent) had taken an honors science course.

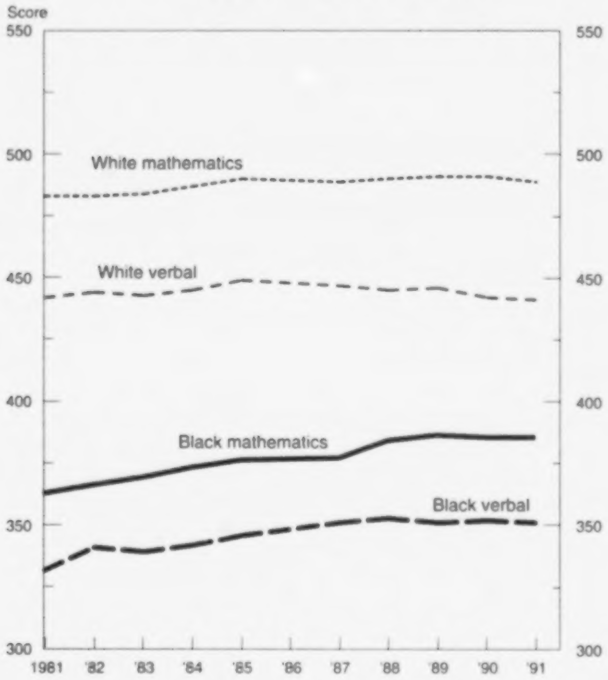
---

[4] Figures for science assessment scores are taken from table 28 in appendix B of this report.

SAT Scores. In 1991, almost 100,200 blacks took the SAT, accounting for about 10 percent of the total. A majority of these test-takers (58 percent) were female.[5]

Although blacks continued to score lower than whites on both components of the SAT in 1991, the differences narrowed during the decade from 1981 to 1991, largely because the scores of blacks increased while there was little change in the scores of whites (chart 4-1). In 1991, the mean verbal score for blacks was 351—90 points lower than the mean score of 441 for whites. In 1981, however, the difference in scores was 110 points (332 points for blacks versus 442 points for whites).

Chart 4-1. SAT scores of black and white college-bound seniors: 1981-91



NOTE: The score range is 200 to 800. Data are not available for 1986.
SOURCE: Appendix B, table 30

Similar progress is evident on the mathematics component. The point difference between the scores of blacks (385) and whites (489) was 104 in 1991, down from 121 in 1981. Blacks scored 362 in 1981, compared with 483 for whites.

Despite this overall progress, there has been little change in the percentile rankings of SAT scores for blacks. Less than 1 percent of blacks—versus about 3 percent of whites—scored above 650 on the verbal component in 1991 (appendix B, table 31). Similarly, fewer blacks (21 percent) than whites (36 percent) scored between 400 and 499.

This pattern is the same on the math portion of the exam. In 1991, only 1 percent of blacks, but 10 percent of whites, scored above 650. About 26 percent of blacks, compared with 29 percent of whites, scored between 400 and 499.

Achievement Test Scores. Blacks constitute about the same proportion of science and mathematics achievement test-takers as they do of all achievement test-takers. Science and math achievement tests are offered in biology, chemistry, physics, and mathematics level I and level II. In 1991, about 4 percent of seniors who had taken one or more of the science and math tests were black and 61 percent were white.[6] Scores for blacks, however, were lower on each of the five exams by 68 to 74 points (appendix B, table 32). The highest score for blacks (596) was on the mathematics level II test; their lowest score (486) was on the mathematics level I test. The highest score for whites (667) was also on the mathematics level II test, and their lowest score (554) was on the mathematics level I test.

SAT mathematics scores for blacks and whites who took one or more of these exams were above the SAT national average in math of 474; however, blacks' scores were lower than whites' (appendix B, table 32). For blacks, the range in SAT scores was from 494 for those who took the mathematics level I test to 592 for those who took the physics test. For whites, the range was 578 (mathematics level I) to 670 (physics).

Advanced Placement Examinations Scores. About 4 percent of all advanced placement examinations (17,320 of 480,696) were taken by blacks and 70 percent (338,863) were taken by whites in 1990.[7] Percentages for science, mathematics, and computer science tests were about the same for blacks, but were slightly lower for whites: about 3 percent of the science, mathematics, and computer science tests were taken by blacks, whereas roughly 68 percent of the tests were taken by whites.[8]

Mean scores for blacks on advanced placement science and mathematics/computer science tests were lower than those for whites, and, in 1990, generally fell in the upper 1 (no recommendation for credit) to the mid 2 (possibly qualified for credit) range (table 4-1). Blacks' highest score was 3.08, on the mathematics/calculus BC exam. For whites, the highest score was 3.65, on the mathematics/calculus BC exam. Since the mid-eighties, scores for both blacks and whites have shown a steady decline on most of the science and mathematics/computer science tests.[9] The fields in which these declines were most evident were biology and physics C-mechanics.

---

[5] College Bound Seniors, 1991 Profile of SAT and Achievement Test Takers, National Report (Princeton, NJ: Educational Testing Service, 1991), p. 6.

[6] College Bound Seniors, National Report, p. 11. Figures for blacks and whites are from unpublished reports available from The College Board of the Educational Testing Service.

[7] Advanced Placement Program of the College Entrance Examination Board, 1990 Advanced Placement Program, National Summary Reports (Princeton, NJ: Educational Testing Service, 1990), p. 3.

[8] 1990 Advanced Placement Program, National Summary Reports, p. 3. Science includes biology, chemistry, and physics tests.

[9] National Science Foundation, Women and Minorities in Science and Engineering, NSF 90-301, January 1990, p. 37.

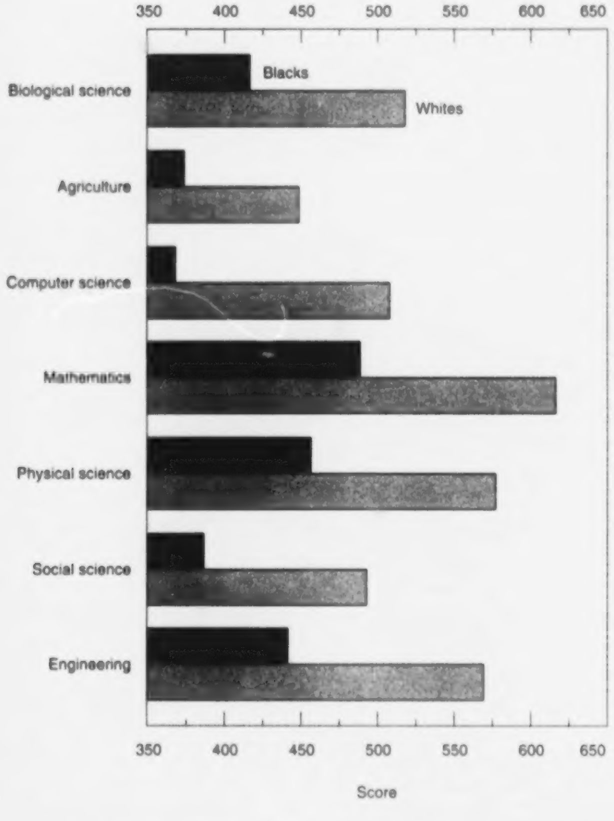
Table 4-1. Advanced placement scores for black and white test-takers: 1990

Exam	Blacks	Whites
Biology	2.07	2.97
Chemistry	1.96	2.93
Physics B	2.05	2.79
Physics C-mechanics	2.44	3.38
Physics C-electricity and magnetism	2.75	3.33
Mathematics/calculus AB	2.31	3.24
Mathematics/calculus BC	3.08	3.65
Computer science AB	2.04	2.88
Computer science A	1.80	3.00

SOURCE: Appendix B, table 33

Intended Undergraduate Major. The same percentages of blacks and whites (24 percent) intended to major in a science field in 1991 (appendix B, table 34). Substantial differences exist by field. For example, 83 percent of blacks who intended to major in science chose either computer or social sciences. For whites, the proportion planning to major in one of these fields was 63 percent. The pattern in SAT math scores for those seniors planning undergraduate majors in science was similar to overall trends: blacks scored lower than whites, regardless of intended field of study (chart 4-2). The largest difference (368 versus 508) was for students who intended to major in computer science.

Chart 4-2. SAT mathematics scores for black and white college-bound seniors, by intended S&E major: 1991



NOTE: The score range is 200 to 800.
SOURCE: Appendix B, table 34

About 11 percent of blacks intended to major in engineering in 1991, compared with 10 percent of whites (appendix B, table 34). Since the early eighties, this percentage has remained relatively stable for blacks but has fallen steadily among whites. There was also some narrowing in the score differential on the mathematics exam for blacks and whites intending to major in engineering. In 1991, scores for blacks (442) were 127 points lower than those for whites (569); in 1978, the difference was 139 points.[10]

Undergraduate Education

Characteristics of American Freshmen [11]

Grade Point Average. There are very large differences in the self-reported high school GPAs of blacks and whites. Only approximately one-third as many blacks as whites in the 1990 freshman class said their GPA was in the A range (11 percent versus 32 percent). A much larger percentage of blacks reported their grades as C or below (32 percent, compared with 11 percent for whites). The proportions of black and white freshmen reporting GPAs in the A range in 1980 were similar: 10 percent of blacks and 29 percent of whites.

Degree Aspirations. In 1990, about 17 percent of blacks, compared with 14 percent of whites, planned to obtain a doctorate. Likewise, higher proportions of blacks (15 percent) than whites (13 percent) planned either a law or medical degree. The baccalaureate, on the other hand, was the highest degree planned by 23 percent of blacks and 29 percent of whites, and 39 percent of blacks and 41 percent of whites intended to earn a master's degree.

Level of Parents' Education. The level of parental education is somewhat lower for blacks than whites, although the differences are narrower for mothers than for fathers. Slightly less than a third of both black and white freshmen reported that their mothers were high school graduates; 16 percent of blacks and 23 percent of whites indicated that their mothers held a college degree. Differences in the educational level attained by their fathers are much more striking between blacks and whites. For example, 35 percent of black fathers were high school graduates and another 14 percent held college degrees or some graduate education. For whites, these percentages were 23 percent and 25 percent, respectively.

---

[10] Women and Minorities, p. 38.

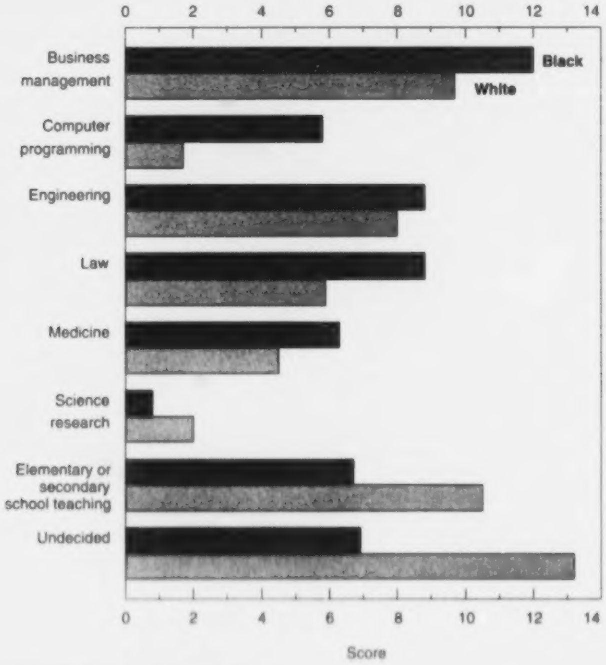
[11] Data by racial/ethnic group are not reliable for those whose probable major is a science or engineering field because of very small sample sizes. Therefore, data in this chapter for American freshmen reflect the characteristics of all freshmen. Data are from unpublished tabulations from the American Freshman Norm Survey. See table 35 in appendix B of this report for figures used in this section; except for information on plans for financial aid.

Annual Parental Income. The distribution of estimated parental income shows black income concentrated at lower levels than that of whites (appendix B, table 35). Roughly 35 percent of black freshmen, but only 9 percent of whites, gave their parents' income at less than $20,000 per year. At the other end of the spectrum, 7 percent of blacks and 23 percent of whites reported household incomes in excess of $75,000.

Plans for Financial Aid. In 1990, black freshmen were financing their educations through grants and loans to a greater extent than were whites. Pell grants were a much more common source of aid for blacks than for whites: about 43 percent of blacks, compared with 16 percent of whites, received assistance from this source. Moreover, a lower percentage of blacks than of whites cited either personal savings (64 percent of blacks, 100 percent of whites) or support from relatives (74 percent of blacks, 85 percent of whites) as one of their sources of funding. Federal student loan programs (National Direct and Federal Guaranteed) were reported by 41 percent of blacks and 27 percent of whites.

Intended Career. Black freshmen were more likely than white freshmen to choose professional or business careers (chart 4-3). For example, about 12 percent of blacks planned to be business managers, 9 percent wanted to be engineers, and 9 percent wanted to practice law. For whites, these proportions were 10 percent, 8 percent, and 6 percent, respectively. Blacks were less likely than whites to choose elementary or secondary school teaching as their intended profession (7 percent versus 10 percent).

Figure 4-3. Intended career choices of black and white freshmen, by selected occupation: 1990



SOURCE: Appendix B, table 36

Graduate Record Examination[12, 13]

In 1987, about 6 percent of Graduate Record Examination (GRE) test-takers who had majored in a science or engineering field were black. Blacks constituted 5 percent of all students who took the GRE. The trend in GRE scores for blacks and whites mirrored that in SAT scores: although blacks continued to score lower than whites on each of the components, the gap had narrowed (table 4-2).

On the verbal component, the overall score for blacks in 1987 was 386, about 130 points lower than that of whites (516). In addition, scores for blacks who majored in science or engineering at the undergraduate level were lower than those for whites, regardless of field. Differences ranged from 96 points (engineering) to 130 points (social science) in 1987. These differences, however, were smaller than they had been in previous years. In 1979, for example, scores for blacks who majored in biological science were 163 points lower than those of whites; by 1987, the difference was 123 points.

Progress has also been made by blacks on the quantitative component of the GRE exam. In 1987, blacks' average score was 390—151 points lower than that of whites (541). This gap

Table 4-2. GRE scores for black and white test-takers, by undergraduate major: 1987

Component and field	Black	White
Verbal		
Physical science	422	546
Mathematical science	371	537
Biological science	404	527
Behavioral science	401	528
Social science	358	488
Engineering	436	532
Quantitative		
Physical science	499	645
Mathematical science	472	673
Biological science	428	581
Behavioral science	382	522
Social science	346	495
Engineering	579	688
Analytical		
Physical science	468	608
Mathematical science	435	639
Biological science	432	582
Behavioral science	409	551
Social science	379	526
Engineering	502	626

NOTE: The score range is 200 to 800 for each component.
SOURCE: Appendix B, table 37

---

[12] Data for GRE test-takers are for U.S. citizens only. See chapter 2, "Education and Training of Women in Science and Engineering," for a description of this examination series.

[13] GRE data more recent than 1987 were unavailable in the format needed to update this report; therefore, this section is the same as in the 1990 report. Figures for S&E majors are from unpublished tabulations by the National Science Foundation, Division of Science Resources Studies.

has narrowed from 162 points 8 years earlier. By S&E major, differences in scores vary tremendously. For instance, blacks who majored in mathematical science scored more than 200 points lower than did whites (472 versus 673), but the difference among engineering majors was 109 points (579 versus 688).

Scores for blacks on the analytical component have also shown significant improvement since the late seventies, although blacks continued to score lower than whites across all S&E fields. In 1987, the overall average score for this group was 404, compared with 554 for whites. This difference of 150 points had decreased from 177 points in 1979. By S&E field, the largest gap in scores (204 points) was among those who majored in mathematical science, and the smallest gap (124 points) was among engineering majors.

Bachelor's Degree Production[14]

The number of bachelor's degrees in science and engineering awarded to blacks fell from 18,743 in 1979 to 18,405 in 1989. In 1989, blacks accounted for 5.5 percent of all S&E baccalaureate recipients; in 1979, they accounted for 5.8 percent (based on appendix B, table 41).

The overall decline in bachelor's degree production masks very different trends. Although the number of blacks earning degrees in the agricultural and biological sciences, social sciences, and psychology fell, the number earning degrees in computer science and engineering rose dramatically. The number of computer science degrees earned by blacks in 1989 (2,457) was 385 percent higher than the number earned in 1979 (507). The number of engineering degrees increased from 1,775 in 1979 to 3,154 in 1989. Despite these increases, however, approximately one-half of blacks earned their degrees in either the social sciences (34 percent) or psychology (15 percent) in 1989. Within engineering, the majority of blacks earned bachelor's degrees in electrical/electronics engineering (41 percent) or mechanical engineering (21 percent) (based on appendix B, table 71).

Graduate Education

Propensity to Attend Graduate School[15, 16]

In 1990, the proportion of recent graduates with S&E training who attended graduate school varied little between blacks and whites. Among students who received S&E bachelor's degrees in 1988 or 1989, about one in five of both blacks (18 percent) and whites (19 percent) was enrolled in full-time graduate studies in 1990. About 10 percent of both blacks and whites were enrolled in graduate school part-time. Blacks with degrees in science and those with degrees in engineering enrolled in graduate school at almost the same rates: for example, 19 percent of blacks with degrees in science and 17 percent of those with degrees in engineering were enrolled in graduate school full-time. For whites, the difference between fields is larger: 22 percent of those with degrees in science, versus 10 percent of those with degrees in engineering, were pursuing graduate study on a full-time basis.

The pattern is similar for recent S&E master's degree recipients. About 18 percent of blacks, and 21 percent of whites, were attending graduate school full-time in 1990.[17]

Graduate Enrollment[18, 19]

The number of blacks enrolled in graduate science and engineering programs was 17 percent higher in 1990 than in 1983.[20] In 1990, 4 percent (12,891 of 299,110) of all students enrolled in graduate studies in S&E fields were black; 81 percent (241,210) were white. (appendix B, table 46). In comparison, the enrollment of whites in S&E fields in 1990 was approximately 7 percent higher than in 1983 (226,010).

The field distributions of blacks and whites differ substantially. Blacks are more likely than whites to be enrolled in science, especially social science, programs. In 1990, about 86 percent of blacks were in graduate programs in science fields; about 46 percent of these students were in social science (based on appendix B, table 46). In contrast, 78 percent of whites were enrolled in science fields, and 27 percent of these were in social science. In 1990, 14 percent of black S&E graduate students were enrolled in engineering fields, compared with 22 percent of white students.

Advanced Degree Production

Master's Degrees.[21] Production of master's degrees in S&E fields declined for blacks after the late seventies. In 1979, blacks accounted for 4.0 percent (1,988) of the 50,201 master's degrees awarded to U.S. citizens and permanent residents; by 1989 the proportion had dropped to 3.2 percent (1,688 of 51,872 degrees awarded) (appendix B, table 51). Not only had the proportion of degrees awarded to blacks grown smaller, but the number of S&E degrees had decreased by 15 percent.

The field distribution of master's degrees was similar to that at the bachelor's level. Almost half of the degrees earned by blacks in 1989 were in social science (22.5 percent) or psychology (23.4 percent) (appendix B, table 51). However, the largest number of degrees (401 or 23.8 percent) was earned in engineering. Within engineering, blacks tended to earn degrees in electrical/electronics (29 percent), industrial (12 percent), and mechanical (11 percent) engineering (based on appendix B, table 71).

---

[14] Data on bachelor's degrees are for U.S. citizens and non-citizens in the United States on permanent visas.

[15] Data for this section are from the National Science Foundation's biennial Survey of Natural Science, Social Science, and Engineering Graduates. The most recently completed survey was for 1990.

[16] National Science Foundation, Survey of Natural Science, Social Science, and Engineering Graduates, unpublished tabulations, table 51.

[17] Survey of Natural Science, Social Science, and Engineering Graduates, unpublished tabulations, table 51.

[18] Data for this section are from the National Science Foundation's annual Survey of Graduate Students and Postdoctorates in Science and Engineering.

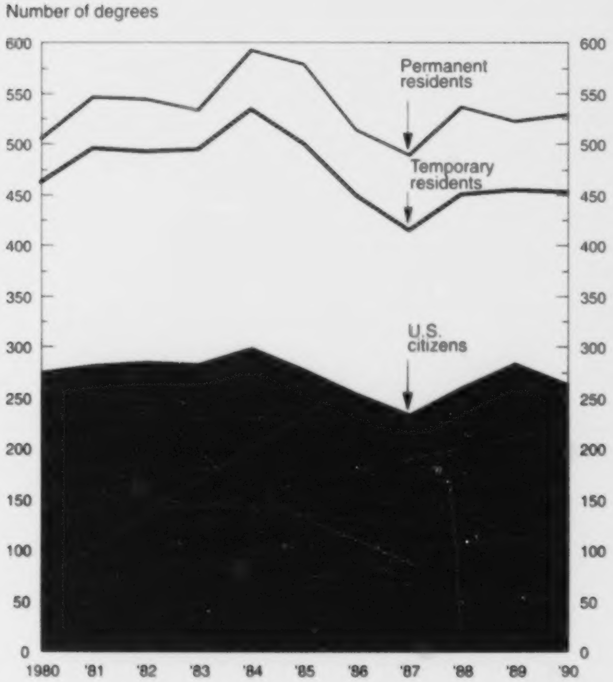
[19] Data on graduate enrollment by racial or ethnic group are for U.S. citizens only.

[20] 1983 is the earliest year for which comparable data for racial and ethnic groups are available.

[21] Master's degree figures are for U.S. citizens and non-citizens in the United States on permanent visas.

Doctorates. The 533 doctorates awarded to blacks in science and engineering in 1990 represent a 4.5-percent increase over the number awarded in 1980 (510) (based on appendix B, table 59). However, the actual average annual growth (calculated using 11 years of data) in the number of black Ph.D.'s over the decade was only 0.7 percent. This small increase is attributable to the growth in the number of blacks who were non-U.S. citizens on permanent visas; their number grew at an average annual rate of 8.3 percent (chart 4-4). While the number of blacks on permanent visas earning doctorates increased, the number of black doctoral students who were U.S. citizens declined annually at a rate of 0.2 percent. As a result, black U.S. citizens represented about half of black Ph.D. recipients in 1990; they had represented 54 percent a decade earlier. Blacks with permanent visas grew from 8.4 percent to 14.2 percent of total black Ph.D.'s. The number of temporary black residents grew at an annual rate of 0.5 percent over the decade, but the proportion declined from 36.5 percent to 35.3 percent of total black Ph.D.'s.

Chart 4-4. Black S&E doctorate recipients, by citizenship: 1980-90



SOURCE: Appendix B, tables 60-62

For black U.S. citizens, declines in doctoral study were most evident in psychology, mathematics, and social sciences. The number of degrees awarded to blacks in these three fields dropped from 202 in 1980 to 180 in 1990. The number of engineering doctorates received by blacks, however, increased from 11 to 28. In 1990, blacks constituted about 1.9 percent of new doctorates awarded to U.S. citizens; in 1980 they accounted for 2.0 percent (based on appendix B, table 60).

Graduate Support Status

Sources of financial support reported by U.S. citizens who were recent S&E doctorate recipients differed somewhat between blacks and whites.[22] In 1990, of those reporting a primary source of financial support for their graduate work, fewer blacks than whites reported university support as their primary source. For U.S. citizens, primary support sources differed as follows (based on appendix B, table 63):

- University funding—42 percent (blacks) versus 55 percent (whites).
- Personal (own or family resources)—37 percent (blacks) versus 33 percent (whites).
- Federal funding—12 percent (blacks) versus 9 percent (whites).

Sources of support for 1990 Ph.D. recipients, regardless of citizenship status, were similar for blacks and whites, with one exception. Blacks were less likely to receive university funds than were whites (46 percent versus 56 percent).[23] About 30 percent of both blacks and whites cited personal funds as a primary source of support and 9 percent of blacks and 8 percent of whites had relied on Federal funds to finance their doctoral education.

National Science Foundation Fellowships [24]

The National Science Foundation's (NSF's) Minority Graduate Fellowship Program began in fiscal year (FY) 1978 as an experimental mechanism designed to increase the number of scientists and engineers from those racial and ethnic minority groups traditionally underrepresented in the advanced levels of the Nation's S&E talent pool. In FY 1978 institutional selection was used as the nominating mechanism, and in FY 1979 the program was redesigned as a national competition to carry out the broadened concept of support of graduate study by minorities.

---

[22] Source of support is available by broad categories only, owing to a 22-percent nonresponse rate to this item on the 1990 Survey of Earned Doctorates. Survey response rates are included in Delores H. Thurgood and Joanne M. Weinman, Summary Report 1990: Doctorate Recipients from United States Universities, National Research Council, Office of Scientific and Engineering Personnel, National Academy Press, 1991, pp. 88-93.

[23] National Research Council, Office of Scientific and Engineering Personnel, Survey of Earned Doctorates, unpublished tabulations.

[24] Data for this section are from the NSF's Minority Graduate Fellowship Program, administered by the Division of Research Career Development in the Directorate for Science and Engineering Education. Minority data are collected only in the aggregate, and include both racial and ethnic minorities. Information presented here is from unpublished sources.

In FY 1990, the number of applicants to the Minority Fellowship Program was 869 (appendix B, table 69), up from 404 in FY 1980 (appendix B, table 67) and 612 in FY 1985 (appendix B, table 68). By field, about 46 percent of the applicants were in engineering, mathematics, or the physical sciences; 30 percent were in the behavioral and social sciences; and 24 percent were in the life and medical sciences. The engineering field had the highest number of applicants in FY 1990 (211), followed by social science (92).

Of the 869 applicants in FY 1990, about 35 percent were offered either new awards (150) or continuations (151) (appendix B, table 69). An additional 29 percent (253) received honorable mentions. In FY 1980, 31 percent of the 404 applicants received new (55) or continuing awards (72), and 32 percent (130) received honorable mentions.

Postdoctoral Appointments

In 1989, blacks held 214 postdoctoral appointments in science and engineering, or 1.4 percent of the total; whites held 82 percent (12,046) of all such appointments (appendix B, table 70). The number of black postdoctoral appointments in 1989 was more than triple the number in 1979 (66).[25]

The vast majority of postdoctoral appointments for both blacks (88 percent) and whites (98 percent) in 1989 were in science fields. About 12 percent of blacks and 2 percent of whites held postdoctoral appointments in engineering in 1989. Within the sciences, 60 percent of black and 62 percent of white appointment holders were concentrated in the life sciences field.

ASIANS

Precollege Preparation[26]

Characteristics of College-Bound Seniors

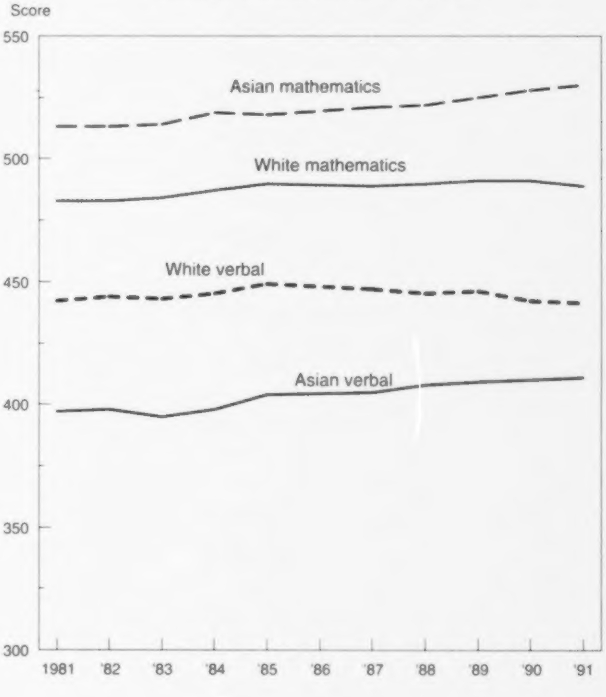
College-bound seniors are those high school seniors who take the SAT. All students, including temporary residents of the United States, are eligible to take this exam. The SAT is used as a criterion in admissions decisions in many U.S. colleges and universities. In 1991, about 44 percent of the Asians who took the examination were not U.S. citizens: 29 percent were permanent residents and about 15 percent were on temporary visas.[27] In contrast, almost all of the whites who took the exam (98 percent) were U.S. citizens.

Coursework. Data on the types of mathematics and science coursework taken by college-bound high school seniors indicate that Asians are better prepared academically for the SAT than are whites. In terms of mathematics coursework, 94 percent of both Asians and whites had taken geometry, but much higher proportions of Asians in 1991 had taken either trigonometry or calculus (appendix B, table 29). For example, twice as many Asians as whites had taken a calculus course (38 percent versus 19 percent). Asians were also more likely than whites to have taken honors math courses (37 percent versus 24 percent).

The same pattern is evident for science courses. Whereas almost all students had taken biology, Asians reported taking a chemistry or physics course more often than did whites. For instance, the proportions of Asian and white students who reported taking courses in physics were 64 percent and 44 percent, respectively, in 1991. A larger percentage of Asians reported having taken an honors science course; however, the percentage difference (32 percent versus 23 percent) was not as great as that for honors math courses.

SAT Scores. In 1991, Asians constituted about 7.4 percent (76,700) of the college-bound seniors who took the SAT.[28] About equal numbers of Asian males and females took this exam.

Chart 4-5. SAT scores for Asian and white college-bound seniors: 1981-91



NOTES: The score range is 200 to 800. Data are not available for 1986.

SOURCE: Appendix B, table 30

---

[25] National Science Foundation, Characteristics of Doctoral Scientists and Engineers in the United States: 1979, NSF 80-323, Survey of Science Resources Series, table B-4, p. 18.

[26] For explanations and definitions of the data sets and examinations used in this section, see chapter 2, "Education and Training of Women in Science and Engineering." Data on mathematics and science achievement from the National Assessment of Educational Progress are not collected separately for Asian students.

[27] College Bound Seniors, National Report, p. 6. Figures for Asians are from an unpublished report available from The College Board of the Educational Testing Service.

[28] College Bound Seniors, National Report, p. 6.

Between 1981 and 1991, scores for Asians on the verbal component of the SAT were lower than those for whites; their mathematics scores remained higher, however (chart 4-5). In 1991, Asians' verbal scores averaged 411, which was 30 points lower than the average for whites (441). In 1981, there was a 45-point difference between the scores of Asians (397) and whites (442). This narrowing of the gap is the result of a steady increase in Asian scores, accompanied by virtually no change in the scores of whites.

Asians score higher than whites on the mathematics component: this difference has increased over the decade. In 1991, the average score for Asians (530) was 41 points higher than that for whites (489); this differential was up from 30 points a decade earlier, when the average score was 513 for Asians and 483 for whites. The widening gap is attributable to the fact that scores for Asians increased more than did those for whites.

The proportion of college-bound seniors who scored above 650 on the verbal section of the SAT was 5 percent for Asians versus 3 percent for whites (appendix B, table 31). On the mathematics component, more than twice as many Asians as whites (22 percent versus 10 percent) scored in the top range (650 to 800).

Achievement Test Scores. Asians account for a slightly higher percentage of achievement-test-takers in science and mathematics than of all those who take achievement tests in any field. In 1991, about 19 percent of the students who had taken one or more science or math achievement tests were of Asian descent; 16 percent of the students who had taken an achievement test in at least one field were Asian.[29] The proportions of test-takers who were white were 61 percent of those who had taken science and mathematics achievement tests and 62 percent of those who had taken an achievement test in at least one field.

In 1991, Asians scored about the same as whites or slightly higher on science and mathematics tests. The largest differences in scores were on the mathematics level I and level II exams (appendix B, table 32). Differentials on these tests were 19 points and 15 points, respectively, in favor of Asians. The SAT mathematics scores for Asians who had taken science and mathematics achievement tests were higher than scores for whites who had taken these tests.

Advanced Placement Examinations Scores. Almost 13 percent of all advanced placement exams (61,862 of 480,696) were taken by Asians and 70 percent (338,863) were taken by whites.[30] However, over 18 percent of the advanced placement exams in science, mathematics, and computer science were taken by Asians and 68 percent were taken by whites.[31]

With the exception of the computer science exams, Asians achieved higher scores than whites on all advanced placement exams (table 4-3). Asians scored roughly 3 (qualified) or above on the science and mathematics tests; whites tended to score in the upper 2 (possibly qualified) to 3 range.

Table 4-3. Advanced placement scores for Asian and white test-takers: 1990

Exam	Asian	White
Biology	3.17	2.97
Chemistry	3.20	2.93
Physics B	2.97	2.79
Physics C-mechanics	3.49	3.38
Physics C-electricity and magnetism	3.34	3.33
Mathematics/calculus AB	3.43	3.24
Mathematics/calculus BC	3.72	3.65
Computer science AB	2.74	2.08
Computer science A	2.94	3.00

SOURCE: Appendix B, table 33

Intended Undergraduate Major. Asian seniors are slightly more likely than white seniors to choose science and engineering fields as their intended undergraduate major (37 percent versus 34 percent; appendix B; table 34). They are also almost twice as likely to choose an engineering discipline. In 1991, about 17 percent of Asians and 10 percent of whites planned to major in engineering. Within the sciences, Asians plan to major in biology and computer science slightly more often than do whites.

SAT mathematics scores for Asians who intend to major in science or engineering are higher than those for the comparable population of whites (chart 4-6). The largest differential in 1991, 53 points, was for those who intended to major in biological science (scores were 571 for Asians versus 518 for whites).

Undergraduate Education

Characteristics of American Freshmen[32]

Grade Point Average. The self-reported high school grades of Asian freshmen were substantially higher than those of whites in 1990 (appendix B, table 35). Almost half (48 percent) of Asian freshmen said that their grade point averages were in the A range; the proportion for whites was 32 percent. Moreover, almost twice as many whites as Asians had averages of C or below: 11 percent versus 6 percent. In 1980, about 42 percent of Asian freshmen reported high school GPAs in the A range and 8 percent reported GPAs of C or below; these percentages for whites were 29 percent and 12 percent, respectively.

---

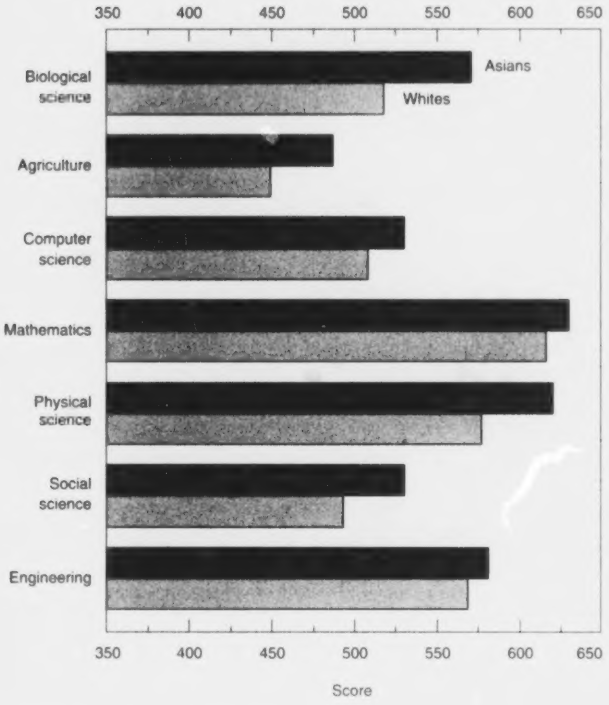
[29] 1991 Profile of SAT and Achievement Test Takers (Asian and White Profiles), 1991, p. 11.

[30] 1990 Advanced Placement Program, National Summary Reports, p. 3.

[31] 1990 Advanced Placement Program, National Summary Reports, p. 3. Science includes biology, chemistry, and physics.

[32] Data by racial/ethnic group are for all freshmen and not just those whose intended major is science or engineering. All figures are from the American Freshman Norm Survey and are contained in table 35 in appendix B of this report.

Chart 4-6. SAT mathematics scores of Asian and white college-bound seniors, by intended S&E major: 1991



NOTE: The score range is 200 to 800.
SOURCE: Appendix B, table 34

Degree Aspirations. In 1990, over 42 percent of Asian freshmen planned to obtain either a doctorate (23 percent) or a medical degree (20 percent). In comparison, 21 percent of whites planned to become Ph.D.'s (14 percent) or medical doctors (7 percent). A much lower proportion of Asians than of whites (14 percent versus 29 percent) indicated that their highest degree would be a baccalaureate.

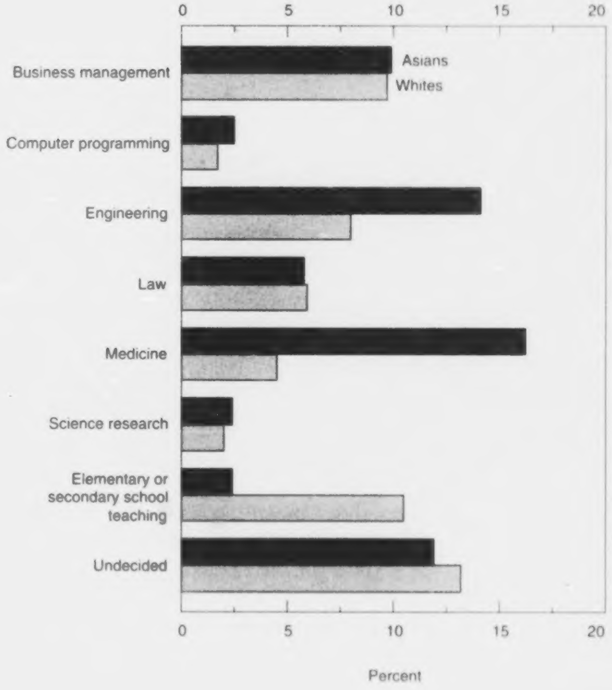
Level of Parents' Education. Parents' education levels differ somewhat between Asian and white freshmen. More Asians than whites report that their mothers and fathers have less than a high school education. It is interesting that higher percentages of Asians also report that their parents have graduate degrees. For example, in 1990, 12 percent of Asian freshmen, compared with 7 percent of whites, said their fathers were not high school graduates; however, at the same time, almost 33 percent of Asians and 22 percent of whites indicated that their fathers held graduate degrees. For mother's education, 17 percent of Asians and 5 percent of whites reported less than high school; 17 percent of Asians and 12 percent of whites reported that their mothers had graduate degrees.

Annual Parental Income. Asian freshmen's estimates of their parents' income are somewhat lower than those of white freshmen. In 1990, about 20 percent of Asians and 9 percent of whites reported household incomes of less than $20,000. The percentage reporting income in excess of $75,000 was 23 percent for both Asians and whites.

Plans for Financial Aid.[33] A majority of both Asian and white freshmen reported that they received financial assistance from parents and relatives and used their savings to finance their first year of college. In 1990, about 85 percent of both Asians and whites cited parents and relatives as one source of aid; 82 percent of Asians and 100 percent of whites listed savings. Approximately one-third (32 percent) of Asians stated they received either a Federal Guaranteed Student loan (21 percent) or a National Direct Student Loan (11 percent). Proportions for whites were 20 and 7 percent, respectively.

Intended Career. Coincident with their higher degree aspirations, 30 percent of Asian freshmen in 1990 planned to become either engineers (14 percent) or physicians (16 percent); the comparable figure for whites was about 13 percent (engineers, 8 percent; physicians, 5 percent) (chart 4-7). Among other careers, Asians chose elementary or secondary school teaching as their intended profession to a much lesser extent than did whites (2 percent versus 11 percent).

Chart 4-7. Intended career choices of Asian and white freshmen, by selected occupation: 1990



SOURCE: Appendix B, table 36

---

[33] Students were asked to select all sources of financial aid that applied; therefore, students may be included in more than one category.

Graduate Record Examination [34, 35]

In 1987, about 4 percent of GRE test-takers who majored in science or engineering at the undergraduate level were Asian; among all test-takers, 3 percent were Asian. Asians generally scored lower than whites on the GRE verbal and analytical components, but higher on the quantitative section (table 4-4).

On the verbal component, the overall score of 476 for Asians in 1987 was 40 points lower than that for whites. Differences in scores for Asians and whites who majored in S&E fields varied dramatically. For example, the verbal scores of Asians who majored in mathematical science were 96 points lower than those of whites; for biological science majors, the gap was 16 points. Between 1979 and 1987, scores for Asians on this component rose more than did those for whites (appendix B, table 37).

Table 4-4. GRE scores for Asian and white test-takers, by undergraduate major: 1987

Component and field	Asians	Whites
Verbal		
Physical science	516	546
Mathematical science	441	537
Biological science	511	527
Behavioral science	504	528
Social science	460	488
Engineering	451	532
Quantitative		
Physical science	672	645
Mathematical science	658	673
Biological science	612	581
Behavioral science	547	522
Social science	517	495
Engineering	682	688
Analytical		
Physical science	583	608
Mathematical science	553	639
Biological science	564	582
Behavioral science	531	551
Social science	484	526
Engineering	554	626

NOTE: The score range is 200 to 800 for each component.
SOURCE: Appendix B, table 37

Average scores on the quantitative section in 1987 were 63 points higher for Asians (604 versus 541), but this difference varies for different S&E majors. For instance, Asian biological science majors scored 31 points higher than whites, but Asian mathematics majors scored 15 points lower.

The pattern of analytical scores for Asians and whites is similar to the pattern of verbal scores. Overall, Asians scored 537—17 points lower than whites—in 1987. For science and engineering graduates, though, there was wide variation in scores. Although there was only an 18-point difference for biological science majors (564 for Asians versus 582 for whites), an 86-point gap was evident for those who majored in math (553 and 639, respectively).

Bachelor's Degree Production [36]

In 1989, Asians received 19,734 S&E degrees, or 6 percent of all S&E bachelor's degrees awarded (336,582). This number was almost triple (279 percent increase) the number awarded to Asians in 1979 (7,080) (appendix B, table 41). The largest increases were in computer science and engineering, which increased by 762 percent and 271 percent, respectively, over their 1979 levels. In 1989, approximately 35 percent (6,903) of S&E degrees granted to Asians were in engineering, 20 percent (3,901) were in the social sciences, 15 percent (2,907) were in biological sciences, and 11 percent (2,268) were in computer science.

Within the field of engineering, Asians tend to earn degrees in electrical and electronics engineering. In 1989-90, approximately 49 percent of all engineering degrees earned by Asians were in electrical and electronics engineering (based on appendix B, table 71). Over one-fourth were in mechanical (16 percent) or computer (10 percent) engineering.

Graduate Education [37]

Propensity to Attend Graduate School

Asian science and engineering degree recipients are much more likely to attend graduate school than are whites. In 1990, approximately 28 percent of Asian baccalaureate holders who had received their degrees in either 1988 or 1989 were in graduate school full-time and 10 percent were enrolled part-time.[38] Of whites, 19 percent attended full-time and 11 percent part-time. In the sciences and engineering, Asians enrolled in graduate school full-time at higher rates than did whites. For example, 33 percent of Asians with bachelor's degrees in science and 20 percent of those with degrees in engineering were enrolled in graduate school. Comparable figures for whites were 22 percent and 10 percent.

At the master's degree level, 35 percent of Asian S&E graduates were full-time graduate students in 1990. In contrast, about 21 percent of white S&E master's degree recipients were in school full-time.[39]

---

[34] Data are for U.S. citizens only. For an explanation of this examination series, see chapter 2, "Education and Training of Women in Science and Engineering."

[35] GRE data more recent than 1987 were unavailable in the format needed to update this report; therefore, this section is the same as in the 1990 report. Figures for S&E majors are from unpublished tabulations by the National Science Foundation, Division of Science Resources Studies.

[36] Data on bachelor's degrees are for U.S. citizens and persons in the United States on permanent visas.

[37] Data on NSF minority fellowships cannot be disaggregated by racial or ethnic group. For a discussion of these awards for all minorities, however, see the section "National Science Foundation Fellowships" for blacks.

[38] Survey of Natural Science, Social Science, and Engineering Graduates, unpublished tabulations, table 51.

Graduate Enrollment [40]

The number of Asians enrolled in graduate science and engineering programs in 1990 (17,474) was almost double the number in 1983[41] (9,393) (appendix B, table 46). In 1990, Asians represented 5.8 percent of total S&E graduate enrollment (9.5 percent of engineering and 4.7 of science). In 1983, Asians accounted for 3.4 percent of total S&E enrollment (5.3 percent of engineering and 2.8 percent of science). In 1990, 39 percent of Asians in S&E graduate programs were enrolled in engineering programs, 13 percent were in biological science programs, and 16 percent were in computer science programs.

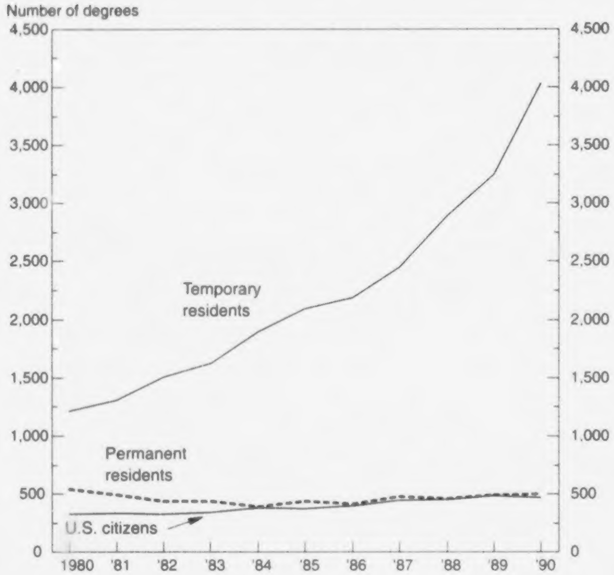
Advanced Degree Production

Master's Degrees.[42] In 1989, Asians represented about 6 percent of S&E master's degree recipients. The number of S&E master's degrees awarded to Asians increased from 1,895 in 1979 to 4,100 in 1989 (appendix B, table 51). Again, more than half of this growth was due to an increase in engineering degrees. The number of master's degrees in engineering awarded to Asians rose from 850 in 1979 to 2,027 in 1989, an increase of 138 percent. In comparison, the number of engineering degrees earned by whites (10,082 in 1979; 13,422 in 1989) increased by 33 percent over the same time period. In 1989, engineering degrees accounted for 49 percent of all master's degrees awarded to Asians. Within engineering, Asians tend to major in the same fields as at the bachelor's degree level—39 percent major in electrical or electronics engineering, 15 percent in computer engineering, and 12 percent in mechanical engineering (appendix B, table 71).

Doctorates. The number of doctorates earned by Asians in science and engineering has also shown a marked increase, rising from 2,118 in 1980 to 5,028 in 1990 (appendix B, table 59). Eighty percent of these degrees were earned by non-U.S. citizens on temporary visas, up from 57 percent in 1980 (chart 4-8). In 1990, about 22 percent of new doctorate recipients were Asian; a decade earlier, 12 percent had been Asian.

The number of S&E doctorates granted to U.S. citizens who were Asian also increased. In 1990, this group earned 467 doctorates (3.4 percent of all doctorates awarded to U.S. citizens), up from 325 (2.4 percent) 10 years earlier (appendix B, table 60). In 1990, 33 percent of these degree recipients were in engineering fields; 26 percent earned Ph.D.'s in agricultural/biological sciences and 18 percent in the physical sciences.

Chart 4-8. Asian S/E doctorate recipients, by citizenship: 1980-90



SOURCE: Appendix B, table 60-62

Graduate Support Status

Asians who earned doctorates in science and engineering in 1990 reported primary sources of financial support that differed greatly from those of whites. For example, of the doctorates who reported a primary source of financial support, 79 percent of Asians reported that they were primarily supported by the university, compared with about 56 percent of whites.[43] Also, 11 percent of Asians used personal funds as the primary means of financing their doctoral education; 31 percent of whites did likewise. Federal support was a primary source of support for less than 2 percent of Asians and 8 percent of whites.

A different picture emerges for Asians, however, when only U.S. citizens who earned these degrees are considered. Among U.S. citizens who earned S&E doctorates in 1990, about 62 percent of Asians and 55 percent of whites received university assistance (based on appendix B, table 63). Of other types of support, 11 percent of Asians, compared with 9 percent of whites, were primarily supported by Federal sources. Asians (20 percent) were less likely than whites (33 percent) to use personal funds to finance their graduate education.

---

[40] Data are for U.S. citizens only.

[41] 1983 is the earliest year for which comparable data for racial and ethnic groups are available.

[42] Data on master's degrees are for U.S. citizens and non-citizens in the United States on permanent visas.

[43] National Research Council, Office of Scientific and Engineering Personnel, Survey of Earned Doctorates, unpublished tabulations.

Postdoctoral Appointments

In 1989, Asians held 16 percent (2,352 of 14,760) of all S&E postdoctoral appointments; whites held 82 percent (12,046) of all such appointments (based on appendix B, table 70). Between 1979 and 1989, the number of Asians with these appointments rose by about 104 percent, compared with a 40-percent increase for whites.[44] By field in 1989, the highest proportions of both Asians (49 percent) and whites (62 percent) held postdoctoral appointments in the life sciences.

NATIVE AMERICANS

Precollege Preparation [45]

Characteristics of College-Bound Seniors

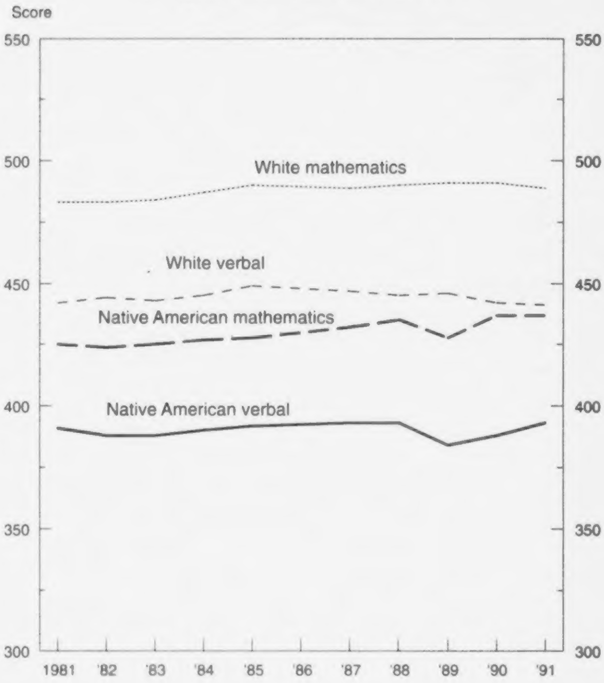
Coursework. Differences in mathematics and science course-taking behavior between Native American and white college-bound seniors are similar to those between blacks and whites. Although Native Americans and whites are equally likely to take introductory coursework, whites take advanced coursework to a much greater extent. In mathematics, the biggest differences arise in trigonometry and calculus. In 1991, for instance, 45 percent of Native Americans reported having taken a trigonometry course, whereas 56 percent of whites did so (appendix B, table 29). In science, Native Americans tend not to take chemistry and physics to the same extent as do whites. For example, 72 percent of Native Americans took chemistry and 33 percent physics. In comparison, 82 percent of whites took chemistry and 44 percent physics.

Scholastic Aptitude Test Scores. Native American representation among SAT test-takers was 0.7 percent (7,843 of 1,032,685) in 1991. About 47 percent of these students were male and 53 percent female.[46]

Native Americans' scores are lower than those of whites on both components of the SAT (chart 4-9). In 1991, the average verbal score was 393 for Native Americans; for whites, it was 441 (appendix B, table 30). Between 1981 and 1991, these scores rose by only 2 points for Native Americans and declined by 1 point for whites. Consequently, there is a 48-point difference between Native American and white scores in 1991, down from a 51-point difference in 1981.

Native Americans have shown slightly more progress on the mathematics section. In 1991, their score of 437 was 52 points lower than that of whites (489); in 1981, this difference was 58 points—the average score was 425 for Native Americans, versus 483 for whites.

Chart 4-9. SAT scores of Native American and white college-bound seniors: 1981-91



NOTES: The score range is 200 to 800. Data are not available for 1986.

SOURCE: Appendix B, table 30

Native Americans are less likely than whites to score above 650 on either component. Only about 1 percent of Native Americans, compared with 3 percent of whites, scored in the 650 to 800 range on the verbal section in 1991 (appendix B, table 31). On the mathematics component, the proportions in the highest range were 3 percent (Native Americans) and 10 percent (whites).

Achievement Test Scores. Native Americans account for very few of either all achievement test-takers or those who take one or more tests in science and mathematics. In 1991, they constituted only about 0.4 percent of each group.[47]

Scores for Native Americans on all science and mathematics achievement tests were lower than those for whites; the gaps ranged from 31 points (mathematics level II) to 56 points (biology) (appendix B, table 32). Likewise, SAT mathematics scores for Native Americans who took these tests were lower than those of whites.

---

[44] Figures for 1979 are from Characteristics of Doctoral Scientists and Engineers: 1979, p. 18. There were 1,155 Asian/Pacific Islanders and 8,593 whites with postdoctorates in 1979.

[45] For explanations and definitions of the data sets and examinations used in this section, see chapter 2, "Education and Training of Women in Science and Engineering." Data for the mathematics and science assessments are not disaggregated for Native American students.

[46] College Bound Seniors, National Report, p. 6.

[47] College Bound Seniors, National Report, p. 11. Figures for Native Americans are from an unpublished report available from The College Board of the Educational Testing Service.

Advanced Placement Examinations Scores. In 1990, Native Americans took about 0.3 percent of all advanced placement tests (1,578 out of 480,696) and also 0.3 percent of the exams in science, mathematics, and computer science.[48] Grades on the science, mathematics, and computer science tests for Native Americans fell between 2 (possibly qualified) and 3 (qualified for college credit), except for physics C-electricity and magnetism, where the average score was 1.5 (table 4-5). The highest advanced placement grade for Native Americans in 1990, an average score of 3.52, was on the mathematics/calculus BC exam. Regardless of field, scores for Native Americans were below those for whites.

Table 4-5. Advanced placement examination scores for Native American and white test-takers: 1990

Exam	Native Americans	Whites
Biology	2.50	2.97
Chemistry	2.20	2.93
Physics B	2.04	2.79
Physics C-mechanics	2.13	3.38
Physics C-electricity and magnetism	1.50	3.33
Mathematics/calculus AB	2.51	3.24
Mathematics/calculus BC	3.52	3.65
Computer science AB	2.23	2.88
Computer science A	2.50	3.00

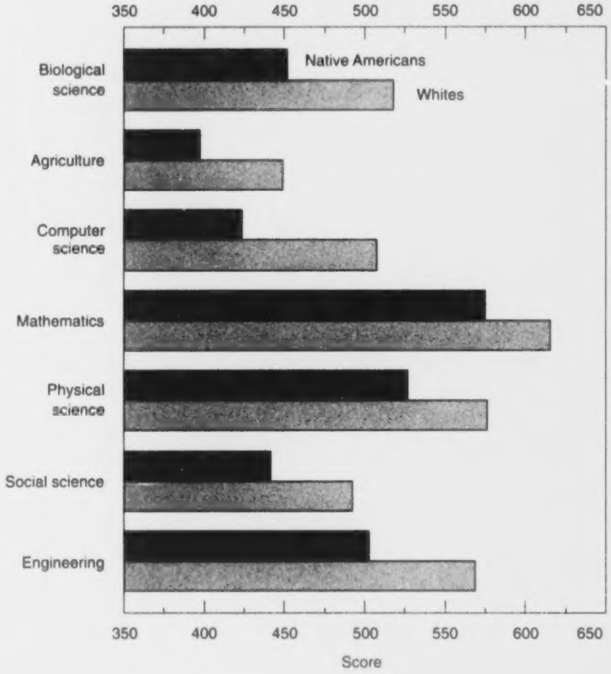
SOURCE: Appendix B, table 33

Intended Undergraduate Major. Roughly one of every four Native American (23 percent) and white (24 percent) seniors planned to major in a science field in 1991 (appendix B, table 34). Within science fields, both Native Americans (12 percent) and whites (13 percent) tended to choose the social sciences as a major. Also, Native Americans (9 percent) and whites (10 percent) indicated engineering as an intended major at about the same rate.

SAT mathematics scores for prospective science majors are lower for Native Americans than for whites (chart 4-10). In 1991, the largest gap (84 points) was among potential computer science majors; Native Americans scored 424, compared with 508 for whites.

As noted above, about the same percentage of Native Americans as whites intended to study engineering. The SAT mathematics scores for these students were 503 for Native Americans and 569 for whites, a 66-point difference.

Chart 4-10. SAT mathematics scores of Native American and white college-bound seniors, by intended S&E major: 1991



NOTE: The score range is 200 to 800.

SOURCE: Appendix B, table 34

Undergraduate Education[49]

Graduate Record Examination[50]

In 1987,[51] Native American representation among GRE test-takers was 0.6 percent. This proportion was about the same as the proportion that had majored in either science or engineering at the undergraduate level. Native Americans scored lower than whites on all components of the GRE (table 4-6). These differences were generally not as large on the quantitative and analytical components for those who majored in science and engineering.

On the verbal component, Native Americans' scores averaged 471 overall in 1987, compared with 516 for whites. For test-takers who had studied science and engineering, the differences between scores ranged from 25 points (physical science) to 48 points (biological science).

---

[48] 1990 Advanced Placement Program, National Summary Reports, p. 3. Science includes biology, chemistry, and physics.

[49] Data are not disaggregated for Native Americans in the American Freshmen Norm Survey.

[50] For an explanation of this examination series, see chapter 2, "Education and Training of Women in Science and Engineering."

Table 4-6. GRE scores for Native American and white test-takers, by undergraduate major: 1987

Component and field	Native Americans	Whites
Verbal		
Physical science	521	546
Mathematical science	500	537
Biological science	479	527
Behavioral science	487	528
Social science	447	488
Engineering	487	532
Quantitative		
Physical science	602	645
Mathematical science	652	673
Biological science	521	581
Behavioral science	459	522
Social science	439	495
Engineering	636	688
Analytical		
Physical science	574	608
Mathematical science	615	639
Biological science	510	582
Behavioral science	490	551
Social science	457	526
Engineering	563	626

NOTE: The score range is 200 to 800 for each component.
SOURCE: Appendix B, table 37

Native Americans' scores on the quantitative section were almost 70 points lower than whites' scores in 1987 (473 versus 541). By S&E field, however, these differences tended not to be as large. For example, Native American and white engineering graduates had scores of 636 and 688, respectively.[52]

The pattern of analytical scores roughly duplicated that of quantitative scores. Although the score for Native Americans overall—487—was 67 points lower than that for whites, differences were generally not as large for S&E majors.

Bachelor's Degree Production [53]

In 1989, S&E baccalaureates were granted to 1,323 Native Americans. These degrees accounted for only about 0.4 percent of the total, but represented an 11-percent increase over the number of Native Americans receiving baccalaureates in 1979 (1,187; appendix B, table 41). However, the number of Native Americans as a proportion of bachelor's degree recipients had not changed; in 1979 they also earned 0.4 percent of the degrees.

Graduate Education [54]

Graduate Enrollment

About 1,050 Native Americans were graduate students in science and engineering programs in 1990 (appendix B, table 46); they constituted about 0.4 percent of the total number of such students. Enrollment in social science (33 percent) and psychology (23 percent) programs accounted for over one-half of these students. Of white graduate students, about 21 percent were in social science and 16 percent were in psychology.

Advanced Degree Production

Master's Degrees.[55] Native Americans also represented about 0.4 percent (205 of 51,872) of the S&E degree recipients at the master's level in 1989 (appendix B, table 51). Almost 41 percent of these degrees were in the social sciences (25 percent) or psychology (16 percent); 17 percent were in engineering.

Doctorates. Forty doctorates in science and engineering were granted to Native Americans in 1990, up from 27 a decade earlier (appendix B, table 59). This number was roughly 0.2 percent of all S&E doctorates awarded in 1990.

Graduate Support Status

Native Americans who received their doctorates in science and engineering in 1990 reported personal finances as the primary source of financial support for their studies. For example, of the 33 Native Americans who reported a primary source of support for their graduate work, 15 cited their own or their family's resources as their primary funding source (appendix B, table 63). The remaining 18 reported they were supported by university funds (10), and received Federal support (5 percent), or support from other sources (3).

Postdoctoral Appointments

The number of Native American postdoctoral appointees in science and engineering was 34 (appendix B, table 70). Almost all of these were either in the life sciences (22) or social sciences (7). About 0.2 percent of all S&E postdoctoral appointments were held by Native Americans in 1989, up from 0.1 percent in 1979, when 15 Native Americans held such appointments.[56]

---

[51] GRE data more recent than 1987 were unavailable in the format needed to update this report; therefore, this section is the same as in the 1990 report. Figures for S&E majors are from unpublished tabulations by the National Science Foundation, Division of Science Resources Studies.

[52] Scores by S&E fields are from unpublished tabulations.

[53] Data on bachelor's degrees are for U.S. citizens and persons in the United States on permanent visas.

[54] Data on NSF minority fellowships cannot be disaggregated by racial or ethnic group. For the discussion of these awards for all minorities, however, see the section "National Science Foundation Fellowships" for blacks.

[55] Data on master's degrees are for U.S. citizens and those in the United States on permanent visas.

[56] Characteristics of Doctoral Scientists and Engineers: 1979, p. 18.

HISPANICS [57]

Precollege Preparation [58]

Mathematics and Science Achievement

Mathematics.[59] Performance on this assessment did not change considerably for Hispanics in the last several years, with the exception of 13-year-olds. Regardless of age level, however, overall mean scores were lower for Hispanics than for all students.

Nine-year-olds. The mean score for Hispanic 9-year-olds in 1990 was 213.8, about 16 points lower than that for all students (229.6). These scores represent increases from 1973 scores of 11.7 points for Hispanics (202.1) and 10.5 points for all students (219.1).

The first major difference in levels of proficiency between Hispanics and all students shows up at level 200 (beginning skills and understanding). Only 68 percent of Hispanics scored at or above this mark, whereas 82 percent of all students did so.

Thirteen-year-olds. The greatest progress made by Hispanics in closing the score gap is at this age level. In 1990, Hispanics' mean score of 254.6 was a little less than 16 points lower than the overall average of 270.4. In 1973, the score differential was 27 points (238.8 for Hispanics versus 266.0 for all students).

Differences in proficiency become very noticeable at level 250 (basic operations and problem solving). About 57 percent of Hispanics, compared with 75 percent of all students, scored at or above level 250. At the 300 level (moderately complex procedures and reasoning), the percentages were 6 and 17, respectively.

Seventeen-year-olds. There was a 21-point difference between the mean scores of Hispanics (283.5) and the overall average (304.6) in 1990. This gap had been somewhat reduced—in 1973, when Hispanics had a mean score of 277.2 and the overall average was 304.4, the difference was 27 points.

One of the largest differences in proficiency between Hispanics and all students was exhibited at level 300 (moderately complex procedures and reasoning). Thirty percent of Hispanics and 56 percent of all students scored over this level.

Science.[60] Progress made by Hispanics on the science assessment was at the 9- and 13-year-old levels. For each age group, Hispanics' scores were lower than the national average. For example, they were 22 points lower for 9-year-olds, 24 points lower for 13-year-olds, and 29 points lower for 17-year-olds.

Nine-year-olds. Hispanics had an overall mean score of 206.2 in 1990; the average for all students was 228.7. This 22-point gap represents an improvement in the difference between Hispanic scores and scores for all students. In 1977, when Hispanic scores were 191.9 and all students averaged 219.9, the gap was 28 points.

Differences in proficiency show up at all levels. The 150 level (everyday facts) was reached by 94 percent of Hispanics, but by 97 percent of all students. By level 200 (simple principles), the proportions were 56 percent and 76 percent, respectively.

Thirteen-year-olds. There was a 24-point gap between the average score of Hispanics and the overall average at this age in 1990 (231.6 versus 255.2). This gap has narrowed considerably (down from 34 points) since 1977, when Hispanics averaged 213.4 and the average for all students was 247.4.

Despite this rise in scores, there is still wide variation in levels of proficiency for Hispanics. Whereas about 80 percent of Hispanics scored at or above level 200 (simple principles), 92 percent of all students did so. About 30 percent of Hispanics, compared with 57 percent of the total, scored at or above level 250 (application of basic information).

Seventeen-year-olds. The point differential between Hispanic scores and total scores was higher at this age than at the 9- and 13-year-old levels. In 1990, the difference was 29 points; 2 points higher than the 1977 gap of 27 points.

Hispanics score at lower proficiency levels than all students; the largest differences occur at the upper levels. For example, whereas 21 percent of Hispanics scored over 300 (ability to analyze procedures and data), the percentage for all students was 43. Likewise, 2 percent of Hispanics, compared with almost 9 percent of all students, scored above the highest level (350—integration of specialized knowledge).

Characteristics of College-Bound Seniors

Coursework. Mexican American college-bound seniors do not take advanced level mathematics and science courses to the same extent as do all seniors. Coursework for Puerto Ricans and Latin Americans, however, is similar to that for all college-bound students.

For mathematics coursework, differences are most notable in the proportions who take a trigonometry course. In 1991, for example, 55 percent of all seniors reported coursework in this subject (appendix B, table 29). Among Hispanics, 44 percent of Mexican Americans, but 51 percent of Puerto Ricans and 53 percent of Latin Americans, had taken trigonometry.

In science, the largest difference is in physics. Forty-four percent of all college-bound seniors took physics in high school, as did the same proportions of Puerto Ricans (42 percent) and Latin Americans (43 percent). Only 34 percent of Mexican Americans, however, had taken a physics course. Within the social sciences, a much larger proportion of Mexican Americans took economics (75 percent) than did all students (52 percent), Puerto Ricans (39 percent) and Latin Americans (57 percent).

---

[57] Data for Hispanics are collected in several ways. Wherever possible, this section distinguishes between different Hispanic groups.

[58] For explanations and definitions of the data sets and examinations used in this section, see chapter 2, "Education and Training of Women in Science and Engineering."

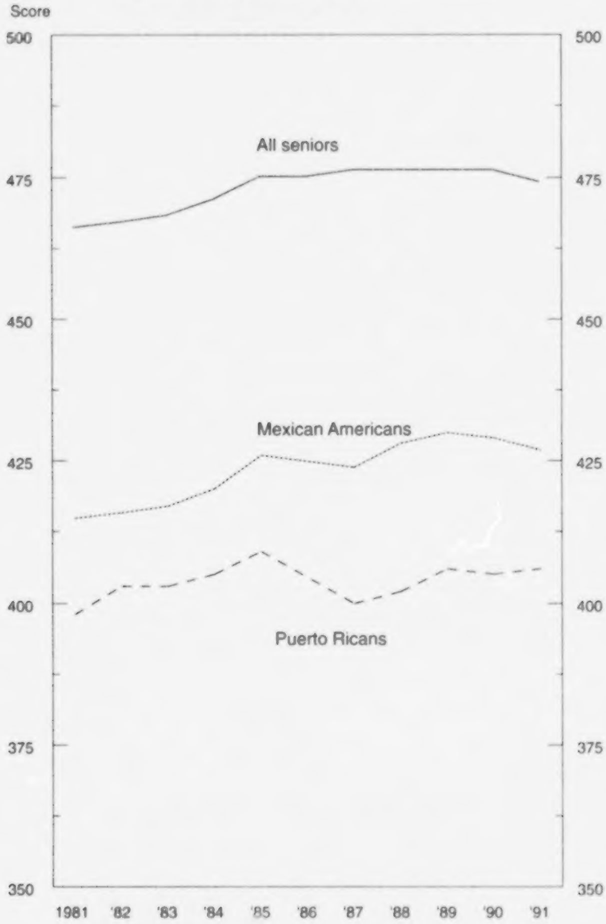
[59] All data on mathematics assessment scores are taken from table 27 in appendix B of this report.

[60] All figures on science assessment scores are based on table 28 in appendix B of this report.

Scholastic Aptitude Test Scores. The representation of Hispanics among college-bound seniors in 1991 shows that about 2.8 percent (28,602 of 1,032,685) of the test-takers were Mexican American, 2.5 percent (25,584) were Latin American, and 1.2 percent (12,065) were Puerto Rican.[61] In all three groups, slightly more than one-half were female.

Hispanics continue to score below the national average on both components of the SAT, although they have made gains over the last 10 years (chart 4-11). Among Hispanics, scores have increased more for Mexican Americans than for Puerto Ricans on the mathematics section.[62]

Chart 4-11. SAT mathematics scores of Hispanic and all college-bound seniors: 1981-91



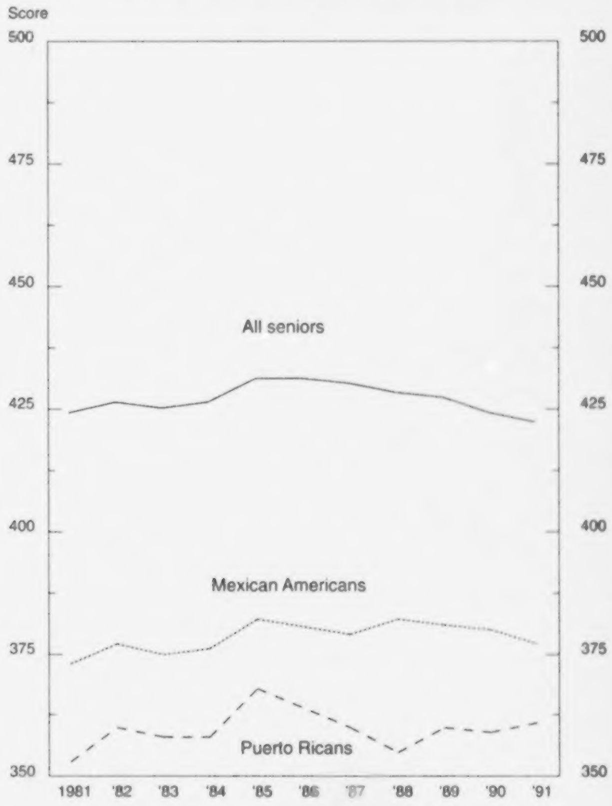
NOTE: The score range is 200 to 800. Data are not available for 1986.
SOURCE: Appendix B, table 30

Scores for Hispanics on the verbal component in 1991 were as follows:

- Latin Americans—382 (40 points below the average of 422 for all college-bound seniors).
- Mexican Americans—377 (45 points below the average, down from 51 points lower in 1981).
- Puerto Ricans—361 (61 points below the average, down from 71 points below the average in 1981).

One factor contributing to lower scores of Hispanics may be a language barrier. In 1991, for example, 8 percent of all seniors reported that English was not their first language; 45 percent of Latin American seniors, 35 percent of Puerto Rican seniors, and 22 percent of Mexican Americans reported that English was not the first language they had learned.[63]

Chart 4-11a. SAT verbal scores of Hispanic and all college-bound seniors: 1981-91



NOTE: The score range is 200 to 800. Data are not available for 1986.
SOURCE: Appendix B, table 30

---

[61] College Bound Seniors, National Report, p. 6.

[62] Data on Hispanics have been available for Latin Americans, Mexican Americans, and Puerto Ricans since 1987. Prior to that time, data were not collected for Latin Americans.

[63] College Bound Seniors, National Report, p. 6.

On the mathematics component, Hispanics also scored lower than average; Latin American and Mexican American scores were somewhat higher than those of Puerto Ricans. In 1991, scores for Hispanics were as follows:

- Latin Americans—431 (43 points below the average of 474 points for all college-bound seniors).
- Mexican Americans—427 (47 points lower, down from a differential of 51 points in 1981).
- Puerto Ricans—406 (68 points lower, compared with 68 points lower in 1981).

One percent of Latin Americans, Mexican Americans, and Puerto Ricans scored in the 650 to 800 range on the verbal test in 1991; 3 percent of all college-bound seniors did so (appendix B, table 31). On the mathematics component, the percentages of Latin Americans (4 percent) and Mexican Americans (3 percent) and Puerto Ricans (2 percent) who scored in this range were again much lower than the percentage of all students who did so (9 percent).

Achievement Test Scores. Slightly more than 5 percent of the college-bound seniors who took one or more science and mathematics achievement tests in 1991 were of Hispanic descent.[64] This proportion is similar to their share of all achievement test-takers (6 percent).[65]

Hispanic college-bound seniors scored lower than did all seniors on the five achievement tests administered in science and mathematics. Unlike the pattern exhibited in scores on the SAT, however, Mexican Americans have the lowest scores among Hispanics, except in chemistry. In 1991, the highest achievement test grade for all Hispanics was on the mathematics level II test. Latin Americans scored an average of 631 and had an SAT math score of 608; Puerto Ricans received a score of 627 on the achievement test and had an SAT mathematics score of 610; and Mexican Americans obtained a score of 599 on the achievement test and an SAT mathematics score of 574. In comparison, all achievement test-takers averaged 666 on the math level II test and had an average SAT math score of 654.

Advanced Placement Examination Scores. About 6 percent (27,377 of 480,696) of all advanced placement exams in 1990 were taken by Hispanics. Of these, 11,585 (42 percent) were taken by Mexican Americans, 2,499 (9 percent) by Puerto Ricans, and 13,293 (49 percent) by "other Hispanics."[66] A larger fraction of all advanced placement tests were taken by Hispanics (5.7 percent) than were exams in science, mathematics, and computer science (3.5 percent).[67]

Although Hispanics received lower scores than all test-takers on science, mathematics, and computer science tests, there was considerable variation by Hispanic subgroup (table 4-7). For example, in 1990, the score ranges were as follows:

- Mexican Americans—1.94 (computer science A) to 3.18 (mathematics/calculus AB).
- Puerto Ricans—2.05 (computer science AB) to 3.20 (mathematics/calculus BC).
- Other—2.06 (computer science AB) to 3.43 (mathematics/calculus AB).

Table 4-7. Advanced placement examination scores for Hispanic and all test-takers: 1990

Exam	All test-takers	Hispanic test-takers		
		Mexican American	Puerto Rican	Other Hispanic
Biology	2.96	2.20	2.41	2.47
Chemistry	2.94	2.10	2.49	2.34
Physics B	2.80	2.13	2.42	2.23
Physics C-mechanics	3.36	2.45	2.82	2.79
Physics C-electricity and magnetism	3.32	2.65	2.42	2.97
Mathematics/calculus AB	3.23	2.72	2.79	2.88
Mathematics/calculus BC	3.65	3.18	3.20	3.43
Computer science AB	2.81	2.25	2.05	2.06
Computer science A	2.92	1.94	2.07	2.24

SOURCE: Appendix B, table 33

Intended Undergraduate Major. About the same proportion of Hispanics as of all college-bound seniors intend to major in either a science field or engineering. In 1991, similar percentages of Latin Americans (24 percent), Mexican Americans (23 percent), and Puerto Ricans (23 percent) planned to major in a science field (appendix B, table 34). An additional 12 percent of each group chose engineering. Among Hispanics who planned an undergraduate S&E major, the highest SAT mathematics scores were for prospective mathematics majors (chart 4-12). Scores for this group were 550 for Latin Americans, 547 for Puerto Ricans, and 530 for Mexican Americans. The highest national SAT mathematics scores (605) were held by those planning to major in mathematics also.

Undergraduate Education

Characteristics of American Freshmen[68]

In 1990, of the freshmen who identified themselves as Hispanic, 75 percent were Mexican American or Chicano and 25 percent were Puerto Rican.

---

[64] College Bound Seniors, National Report, p. 11. Figures for Mexican Americans, Latin Americans, and Puerto Ricans are from unpublished reports prepared for each group. These reports are available from The College Board of the Educational Testing Service.

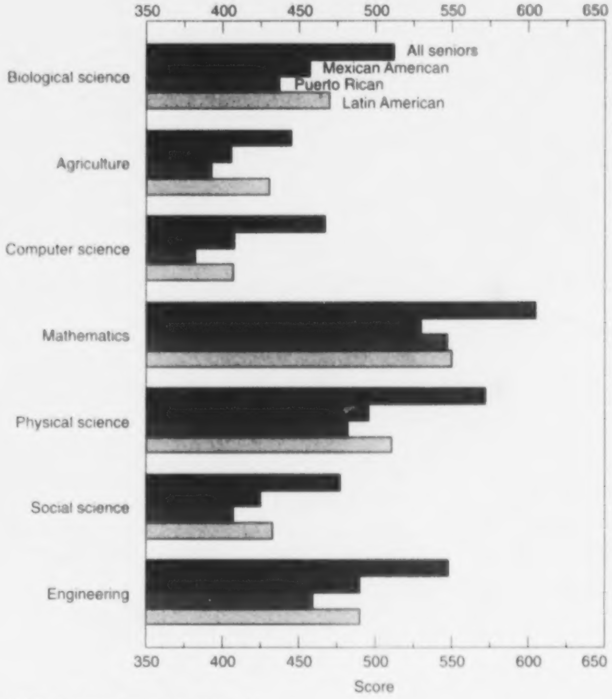
[65] College Bound Seniors, National Report, p. 1. See footnote 64 for source of figures for different Hispanic groups.

[66] 1990 Advanced Placement Program, National Summary Reports, p. 3.

[67] 1990 Advanced Placement Program, National Summary Reports, p. 3. Science includes biology, chemistry, and physics.

[68] Data are from unpublished tabulations from the American Freshman Norm Survey. See table 35 in appendix B of this report for figures used in this section; except for information on plans for financial aid.

Chart 4-12. SAT mathematics scores of Hispanic and all college-bound seniors, by intended S&E major: 1991



NOTE: The score range is 200 to 800
SOURCE: Appendix B, table 34

Grade Point Average. Self-reported GPAs for Hispanics are very similar to those for all freshmen. Twenty-eight percent of Hispanics reported averages in the A range in 1990; about 24 percent of all freshmen did so. There was also little difference at lower levels: 14 percent of Hispanics and 17 percent of all freshmen reported having an average of C or below.

Degree Aspirations. Hispanic freshmen tended to aspire to higher levels of education than did all freshmen. For example, 18 percent planned to study for a doctorate and 10 percent were planning to obtain a medical degree. For all freshmen, these proportions were 14 percent and 6 percent, respectively. Moreover, 23 percent of Hispanics and 30 percent of all freshmen reported a baccalaureate as their highest planned degree.

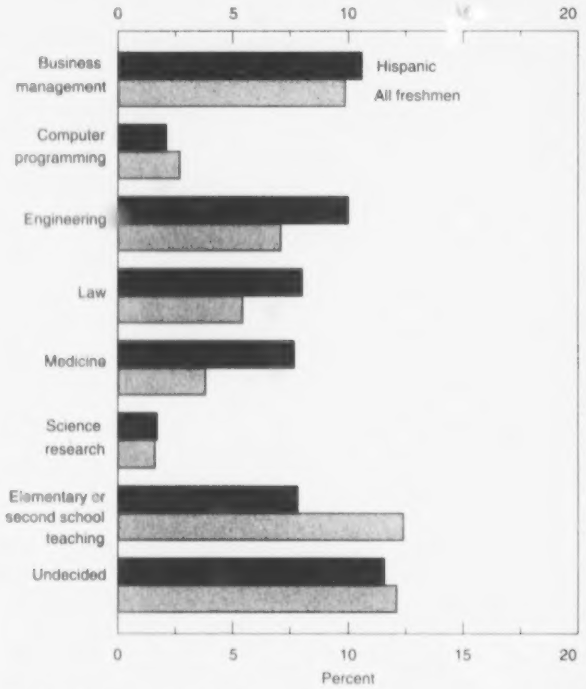
Level of Parents' Education. Substantial differences exist in the level of parents' education reported by Hispanics and by all freshmen. For example, about 34 percent of Hispanic freshmen's fathers, compared with 10 percent for all freshmen, had less than a high school education. In contrast, the percentages of fathers who had college degrees were 14 percent (Hispanics) and 24 percent (all freshmen). Thirty-one percent of Hispanics and 8 percent of all freshmen indicated that their mothers did not have a high school diploma. The percentage of mothers who had college degrees was 13 percent and 23 percent, respectively for Hispanics and all freshmen.

Annual Parental Income. Estimated parental income is lower for Hispanics than for all freshmen. In 1990, approximately 31 percent of Hispanic freshmen reported an annual parental income of less than $20,000; only 16 percent of all freshmen reported income at that level. At the higher income levels—$75,000 and above—the proportions were 9 percent for Hispanics and 17 percent for all freshmen.

Plans for Financial Aid. Hispanic freshmen, in 1990, were less likely to rely on relatives (74 percent) or savings (75 percent) to finance their schooling than were all students (80 percent and 85 percent, respectively). Hispanics also received aid from grants and loans more often than did whites. For example, Pell Grants and Supplementary Education Opportunity Grants were cited by 56 percent of Hispanics as a source of financial aid, and by 30 percent of whites. Federal loan programs were used by 45 percent of Hispanics and 30 percent of whites.

Intended Career. Hispanic freshmen choose engineering (11 percent), law (8 percent), and medicine (8 percent) as their intended career fields more often than do all freshmen (7 percent, 5 percent, and 4 percent, respectively) (chart 4-13). Hispanics were not as likely to plan a career in elementary or secondary teaching as were all freshmen (8 percent versus 12 percent).

Chart 4-13. Intended career choices of Hispanic and all freshmen, by selected occupation: 1990



SOURCE: Appendix B, table 36

Graduate Record Examination [69, 70]

In 1987, about 3.3 percent (5,789) of GRE test-takers were Hispanic, up from 2.8 percent in 1979. Specifically, 1.3 percent (2,226) were Mexican American, 1.1 percent (1,902) were Latin American, and 0.9 percent (1,661) were Puerto Rican. The representation of Hispanic GRE test-takers who majored in an S&E field at the undergraduate level was a little higher than their representation among all GRE test-takers—3.6 percent.

Although Hispanic test-takers who majored in S&E fields scored lower than did all S&E test-takers on the three GRE components, there was wide variation among ethnic subgroups. Scores for Latin Americans were generally higher than those for Mexican Americans or Puerto Ricans, regardless of component (table 4-8). On the verbal component, for example, scores in 1987 were as follows:

- Latin Americans—469, 18 points lower than the overall average.
- Mexican Americans—440, 47 points lower than the overall average.
- Puerto Ricans—380, 98 points lower than the overall average.

Table 4-8. GRE scores for Hispanic and all test-takers, by undergraduate major: 1987

Component and field	All test-takers	Hispanic test-takers		
		Mexican American	Puerto Rican	Latin American
Verbal				
Physical science	505	490	391	496
Mathematical science	483	472	414	468
Biological science	504	471	380	494
Behavioral science	507	458	401	482
Social science	458	421	361	446
Engineering	466	460	401	477
Quantitative				
Physical science	639	584	517	615
Mathematical science	657	613	573	603
Biological science	570	517	456	542
Behavioral science	513	446	403	479
Social science	479	405	378	436
Engineering	673	626	601	634
Analytical				
Physical science	572	529	437	542
Mathematical science	588	546	491	546
Biological science	557	504	426	528
Behavioral science	530	469	418	500
Social science	494	431	383	458
Engineering	563	539	491	542

NOTE: The score range is 200 to 800 for each component.
SOURCE: Appendix B, table 37

Score differences were greatest on the analytical section; scores ranged from 421 for Puerto Ricans (107 points lower than the score for all test-takers) to 493 for Latin Americans (35 points lower). All Hispanics who majored in physical science, mathematical science, or engineering fields received higher scores on the GRE than did social science or life science majors.

Bachelor's Degree Production [71]

The number of S&E baccalaureates awarded to Hispanics has risen steadily in the past several years. In 1989, Hispanics earned 13,860 S&E baccalaureates, representing about 4 percent of the total number of S&E bachelor's degrees awarded to U.S. citizens (based on appendix B, table 41). Ten years earlier, Hispanics had represented 3.2 percent (10,333) of the total. Fields showing the largest increase from 1979 to 1989 were computer science (207 to 1,195), psychology (1,737 to 4,028), and engineering (1,555 to 3,168). Within engineering, over half of Hispanics earned baccalaureates in electrical or electronics engineering (34 percent) or mechanical engineering (21 percent) (based on appendix B, table 71).

Graduate Education [72]

Propensity to Attend Graduate School

Hispanics who had received their bachelor's degrees in science and engineering in 1988 or 1989 were just as likely as all students (roughly 20 percent) to be enrolled in graduate school full-time in 1990. At the master's degree level, however, a lower proportion of Hispanics than of all students pursued graduate studies on a full-time basis (20 percent versus 22 percent).[73]

Graduate Enrollment [74]

Hispanics constituted 3.5 percent (10,502 of 299,110) of graduate enrollment in S&E fields in 1990; they constituted 3.2 percent (8,928 of 278,994) in 1983 (appendix B, table 46). This proportional increase was the result of an 18-percent growth rate in the number of Hispanics enrolled in S&E programs between 1983 and 1990. In comparison, overall graduate enrollment was 7.2 percent higher in 1990 than in 1983.

Hispanics were more likely (81 percent) than all graduate students (76 percent) to be in science rather than engineering programs. By field, Hispanics were more often in social science (29 percent) and psychology (21 percent) than were all students (21 percent and 16 percent, respectively).

---

[69] Data are for U.S. citizens only. For an explanation of this examination series, see chapter 2, "Education and Training of Women in Science and Engineering."

[70] GRE data more recent than 1987 were unavailable in the format needed to update this report; therefore, this section is the same as in the 1990 report. Figures for S&E majors are from unpublished tabulations by the National Science Foundation, Division of Science Resources Studies.

[71] Data on bachelor's degrees are for U.S. citizens and persons in the United States on permanent visas.

[72] Data on NSF minority fellowships cannot be disaggregated by racial or ethnic group. For the discussion of these awards for all minorities, however, see the section "National Science Foundation Fellowships" for blacks.

[73] National Science Foundation, Survey of Natural Science, Social Science, and Engineering Graduates, unpublished tabulations, table 51.

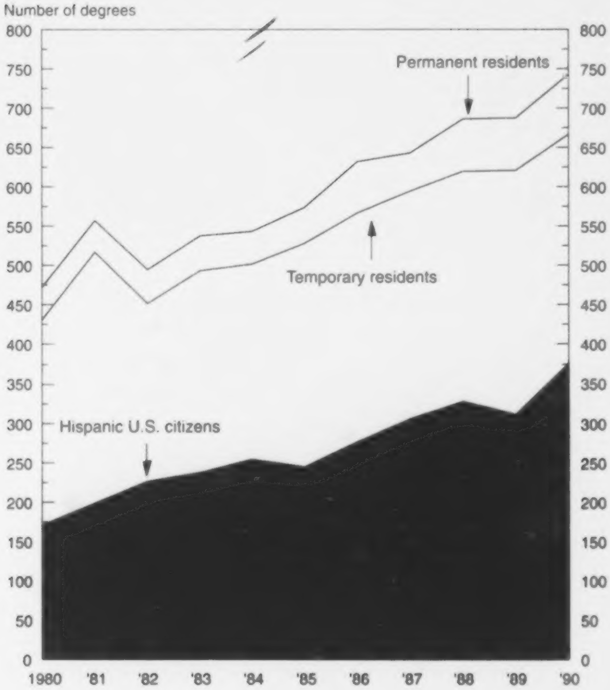
[74] Data are for U.S. citizens only.

Advanced Degree Production

Master's Degrees.[75] In 1989, the number of master's degrees awarded to Hispanics (1,563) had increased by 61 percent over their 1979 level (970). As a result, Hispanics' share of all S&E master's degrees rose from about 2 percent to 3 percent (based on appendix B, table 51). The field distribution of these degrees shows that more than half of these Hispanics graduated in either engineering (31 percent) or psychology (23 percent). Within engineering, the majority of Hispanics majored in four fields—electrical or electronics, mechanical, industrial, and civil engineering (appendix B, table 71).

Doctorates. Of doctorates awarded in science and engineering in 1990, 3.3 percent (746 of 22,673)) were granted to Hispanics, up from 2.7 percent (479 of 17,523) 10 years earlier (appendix B, table 59). Unlike the trend for blacks and Asians, however, the increase largely resulted from higher numbers of Hispanic U.S. citizens earning degrees in these fields (chart 4-14). Over the decade, this number more than doubled, from 171 to 376, and in 1990 U.S. citizens accounted for half of the doctorates awarded to Hispanics.

Chart 4-14. Hispanic S&E doctorate recipients, by citizenship: 1980-90



SOURCE: Appendix B, tables 60-62

Hispanic U.S. citizens showed growth in many fields. The number of Hispanics earning doctorates in the physical sciences rose from 20 in 1980 to 61 in 1990; the number in agricultural and biological sciences, from 30 to 86; the number in psychology, from 51 to 94; and the number in social sciences, from 45 to 74 (appendix B, table 60). Degrees granted to Hispanics in engineering also more than doubled, from 18 in 1980 to 39 in 1990.

Graduate Support Status

Hispanics who earned doctorates in science and engineering in 1990 showed a distribution of primary sources of assistance that was slightly different from that of all doctorate recipients. For example, 53 percent of Hispanics—compared with 60 percent of all students—indicated that universities provided their major source of aid. Twenty-three percent of Hispanics reported personal funds as their primary source of financial support and 9 percent Federal funds; comparable figures for all doctorates were 26 percent and 7 percent.[76]

Among U.S. citizens who reported a primary source of support for their graduate education, about 37 percent of Hispanics and 47 percent of all new doctorate recipients reported that their university was the primary source of support (based on appendix B, table 63). Almost one-fourth of both Hispanics (31 percent) and all Ph.D.'s (20 percent) said that they used primarily personal funds. However, 13 percent of Hispanics and 5 percent of all new Ph.D.'s stated that they received Federal support.

Postdoctoral Appointments

In 1990, there were 469 Hispanics holding postdoctoral appointments in science and engineering, up from 136 in 1977 (appendix B, table 70). Because of this huge increase, Hispanics accounted for 3.2 percent of S&E postdoctoral appointment holders in 1990, compared with 1.4 percent in 1977. By field, over half of Hispanic postdoctoral appointees held appointments in the life sciences; the remainder (25 percent) were concentrated primarily in the physical sciences.

---

[75] Data on master's degrees are for U.S. citizens and those in the United States on permanent visas.

[76] National Research Council, Office of Scientific and Engineering Personnel, Survey of Earned Doctorates, unpublished tabulations.

SECTION III

Persons With Physical Disabilities

chapter 5

persons with physical disabilities in science and engineering

Employment Characteristics 63
  Labor Force Market Indicators 64
  Field 64
Postsecondary Education 65

chapter 5

persons with physical disabilities in science and engineering [1]

The National Science Foundation's (NSF's) intent in collecting data on scientists and engineers with physical disabilities is to estimate the number who have a condition that may in some way limit their physical activity. Data on this population, however, are limited, for two major reasons. First, samples of these individuals are very small and therefore are subject to statistical uncertainty. Second, data on this population are based on self-reported responses to NSF surveys of scientists and engineers. Respondents are asked if they have a physical disability, and, if so, to specify the nature of that disability (visual, auditory, ambulatory, or other). These data therefore reflect individual perceptions.

Definition is another factor affecting data reliability. Specifically, ambiguous terminology makes precise measurement of the number of scientists and engineers who may have a physical disability very difficult. Frequently the terms *disability*, *impairment*, and *handicap* are used synonymously, but their meanings can have important differences. According to the World Health Organization, *impairment* is a "psychological, anatomical, mental loss, or some other abnormality."[2] *Disability* is any restriction on or lack of ability (resulting from impairment) to pursue an activity—such as work—in the manner or within the range considered normal. *Handicap* is a disadvantage resulting from an impairment or disability. Thus, an impairment subject to prejudice is a handicap, whether or not it is a disability.

EMPLOYMENT CHARACTERISTICS

In 1986, the latest year for which data are available, about 94,200 scientists and engineers—2 percent of the total—reported having a physical disability (appendix B, table 74). The population surveyed in 1986 includes an experienced older group of scientists and engineers, and hence some increased disability. For example, 9 percent of the employed scientists and engineers in 1986 who reported their age were 60 years old or older.[3] Of the 94,200 reporting a disability in 1986, about 22 percent reported an ambulatory condition, 22 percent reported a visual condition, and almost 18 percent reported an auditory condition. The remainder did not specify the nature of their disability.

Estimates of the percentage of the U.S. population with disabilities[4] ranged from 15 percent to 17 percent among the general adult population[5] and from 4 percent to 11 percent among the college-aged population.[6] The proportion of the population with disabilities, both severe and nonsevere, increases with age. In 1991, the percentage of the U.S. population with disabilities ranged from 4 percent of persons aged 16 to 24 to 22 percent of those aged 55 to 64. This trend held for the decade (1981 to 1991) for which data are available (table 5-1).

Table 5-1. Severe and nonsevere work disabilities, by age: 1981-91

	Age									
Year	16-24		25-34		35-44		45-54		55-64	
	Nonsevere	Severe	Nonsevere	Severe	Nonsevere	Severe	Nonsevere	Severe	Nonsevere	Severe
1981	2.1	1.4	2.9	2.3	3.8	3.4	5.8	6.5	9.2	14.4
1982	1.8	1.4	2.8	2.3	3.8	3.3	5.6	6.6	9.5	14.6
1983	2.0	1.5	2.7	2.1	4.1	3.0	5.0	6.4	8.6	14.7
1984	1.9	1.2	2.8	2.4	3.8	3.1	5.2	6.3	9.0	14.5
1985	2.2	1.4	2.6	2.2	3.8	3.5	5.4	6.2	10.0	13.7
1986	2.1	1.6	2.8	2.5	3.8	3.4	5.3	5.9	8.9	14.4
1987	1.8	1.7	2.8	2.6	3.9	3.6	5.0	5.9	8.6	13.6
1988	2.1	1.7	2.9	2.7	3.4	3.6	4.3	6.0	8.3	14.0
1989	1.8	1.8	2.8	2.6	4.2	3.8	4.8	6.4	8.2	14.0
1990	1.8	1.8	3.0	2.7	3.9	3.9	5.1	6.6	8.0	14.1
1991	1.9	2.1	2.9	3.3	4.1	3.9	4.8	6.7	8.0	13.9

SOURCE: Current Population Surveys, 1981-1991, U.S. Bureau of the Census

---

[1] This chapter is excerpted from Women and Minorities in Science and Engineering, NSF 90-301, National Science Foundation, January 1990, pp. 57-58, except for information on work disabilities among the U.S. population and disabled students in postsecondary education.

[2] See Johnson and Lambrinos, "Wage Discrimination Against Handicapped Men and Women." Journal of Human Resources, vol. 20, no. 2 (Spring 1985), pp. 264-277.

[3] National Science Foundation, U.S. Scientists and Engineers: 1986, Detailed Statistical Tables, NSF 87-322, 1987, table B-12, p.73.

[4] Disability is defined differently on the various Federal surveys used to provide estimates on characteristics of individuals with disabilities.

[5] National Science Foundation, Report of the National Science Foundation Task Force on Persons With Disabilities, October 1990, p. 17.

[6] National Science Foundation, Report of the National Science Foundation Task Force on Persons With Disabilities, October 1990, p. 17.

The representation of persons with impairments among recent S&E bachelor's, masters's, and doctorate recipients is 1 percent or less at each degree level (appendix B, table 75). No type of impairment (visual, auditory, ambulatory, or a combination of these) was more prevalent than the others.

Labor Force Market Indicators

About 75 percent of the scientists and engineers reporting a physical disability in 1986 (70,300 of 94,200) were employed (appendix B, table 74). Two years earlier, about 91,600 had reported a physical disability; of those, about 74,800 (82 percent) were employed.[7] The labor force participation rate for the physically disabled thus declined from 83 percent in 1984 to 76 percent in 1986.[8] The corresponding rate for all scientists and engineers in 1986 was 95 percent. In 1987, approximately 2 percent of the 450,000 doctoral scientists and engineers reported that they were physically disabled.[9] Of these, 76 percent were employed; in comparison, 93 percent of all doctoral scientists and engineers were employed.

Persons reporting a disability are much more likely to be outside the labor force than are all scientists and engineers. In 1986, the reason cited by the largest percentage of the physically disabled (23 percent) for not being in the labor force was illness. Among all scientists and engineers, only about 2.6 percent cited illness as their major reason for not working or seeking work.[10]

Among those scientists and engineers who do enter the labor force and seek work, neither the physically disabled nor all scientists and engineers have much difficulty in finding jobs. In 1986, the unemployment rate for both groups was 1.5 percent.[11]

Even though the percentage of women with disabilities who are in the work force has been increasing steadily, women with disabilities are still considerably less likely than men with disabilities to be in the work force. In 1991, approximately 29 percent of women and 40 percent of men with disabilities were in the work force (table 5-2). About 26 percent of the men and women in the work force had disabilities labeled "nonsevere" and 15 percent had disabilities considered "severe."

Table 5-2. Percent of disabled in the labor force, by sex and severity of disability, 1981-91

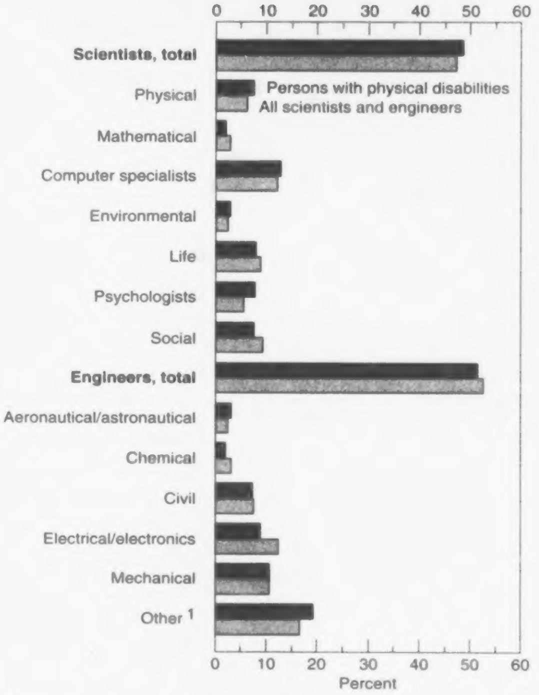
Year	In the labor force		Employed full-time	
	Male	Female	Non-Severe	Severe
1981	41.9	23.5	29.8	11.4
1982	41.5	23.7	27.4	11.9
1983	41.0	24.4	26.2	11.2
1984	40.3	24.4	27.1	11.4
1985	38.2	25.3	25.5	12.0
1986	38.0	25.2	25.8	11.3
1987	39.7	27.1	26.3	12.7
1988	42.1	29.1	28.9	15.0
1989	41.4	30.3	28.2	15.0
1990	41.0	29.8	27.0	15.4
1991	39.5	29.3	26.3	15.1

SOURCE: Current Population Surveys, 1981-1991, U.S. Bureau of the Census

Field

The field distribution of those reporting a physical disability differs only slightly from that of all scientists and engineers (chart 5-1). Those with a disability are about as likely to be scientists as to be engineers. Among science fields, those with a physical disability are somewhat more likely to be psychologists and less likely to be mathematical or environmental scientists.

Chart 5-1. Field distribution of all employed scientists and engineers and employed scientists and engineers with physical disabilities: 1986



[1] Includes industrial, materials, mining, nuclear, petroleum, and other

SOURCE: Based on appendix B, tables 2 and 74

---

[7] National Science Foundation, Science Resources Studies Division, Scientific and Technical Personnel Data System (STPDS), unpublished tabulations.

[8] STPDS, unpublished tabulations. The labor force participation rate is slightly higher than the percentage employed because persons unemployed are included as part of the labor force and are added to the number employed to calculate the participation rate.

[9] National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, 1989. Doctoral scientists and engineers were asked to respond to the question "Are you physically handicapped?"

[10] STPDS, 1986, unpublished tabulations.

[11] STPDS, 1986, unpublished tabulations.

POSTSECONDARY EDUCATION

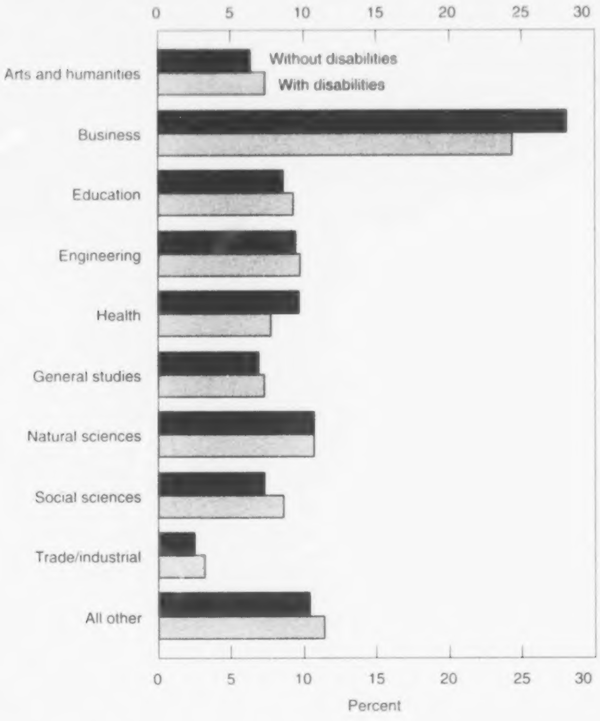
In the fall of 1986, approximately 10.5 percent of the 11.2 million students enrolled in postsecondary institutions were classified as having a disability (table 5-3). Forty-nine percent of students with a disability were women, whereas 55 percent of students without a disability are women.[12] Students with disabilities tended to be older than students without disabilities: approximately one out of three students with a disability was at least 30 years old, whereas only one of every four students without a disability fell into this age range.

Table 5-3. Disabled postsecondary students, by type of disability: fall 1986

Type of disability	Prevalence of disability	Percentage of all students	Percentage of disabled students
Total, any disability	1,319,229	10.5	
Learning disability	160,878	1.3	12.2
Visual handicap	514,681	4.1	39.0
Hard of hearing	265,484	2.1	20.1
Deafness	80,910	0.6	6.1
Speech disability	62,525	0.5	4.7
Orthopedic handicap	231,491	1.8	17.6
Health impairment	320,272	2.6	24.3

NOTE: Details do not add to total because some students had multiple disabilities.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 1987 National Postsecondary Student Aid Study. Profile of Handicapped Students in Postsecondary Education, 1987, CS 89-337, June 1989, p. 8

Chart 5-2. Major field of study of undergraduate students, by disability status: fall 1986



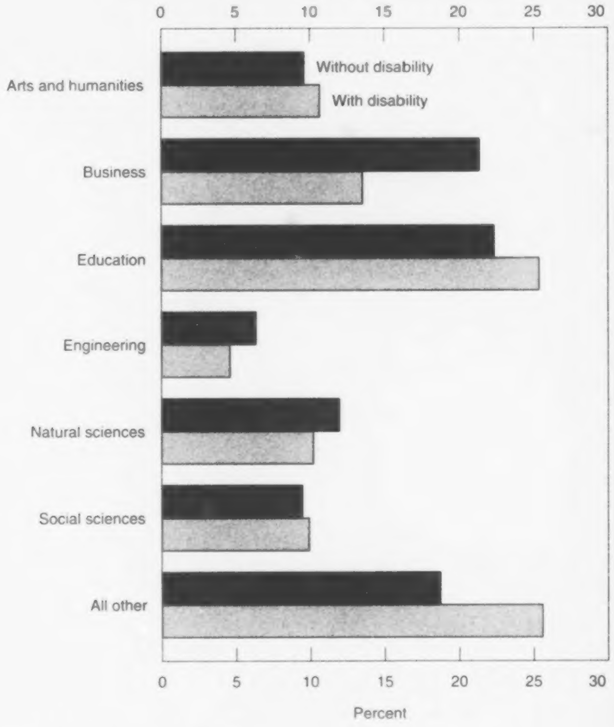
SOURCE: Based on appendix B, table 76

The most prevalent disability among postsecondary students in 1986 was a visual impairment; 39 percent listed this as their type of disability (table 5-3). Approximately one-fourth of the students with disabilities reported that their health was impaired, and about the same percentage, one-fifth, reported that they were hard of hearing or had an orthopedic disability.

In the fall of 1986, about 11 percent of all undergraduates and 8 percent of all graduate students were listed as having a disability (based on appendix B, table 76). At the undergraduate level, about 40 percent of students with disabilities were majoring in science fields and education. For example, 11 percent of students with disabilities were majoring in the natural sciences, 10 percent in engineering, 9 percent in social science, and 9 percent in education (chart 5-2). The distribution of major fields was similar for persons without disabilities: again, 11 percent had a natural science major, 10 percent an engineering major, and 9 percent an education major. However, students without disabilities were slightly less likely to major in social science (7 percent).

Graduate students with disabilities majored in science and engineering fields at a slightly lower rate than did those without disabilities (chart 5-3). For example, 25 percent were

Chart 5-3. Major field of study of graduate students, by disability status: fall 1986



SOURCE: Appendix B, table 76

---

[12] Information on gender and age of students with disabilities is from U.S. Department of Education, National Center for Education Statistics, Profile of Handicapped Students in Postsecondary Education, 1987, CS 89-337, June 1989.

enrolled in the natural sciences (10 percent), the social sciences (10 percent), and engineering (5 percent). Among students without disabilities, 28 percent were science and engineering majors; 12 percent were majoring in the natural sciences, 10 percent in social sciences, and 6 percent in engineering. The largest proportion of students, both with (25 percent) and without (22 percent) physical disabilities, were education majors.

appendices

A. Technical Notes 69

B. Statistical Tables 73

appendix a

technical notes

CONCEPTS AND DEFINITIONS

The National Science Foundation (NSF) publishes a variety of data relating to scientists and engineers. These data—which include estimates of graduate enrollments and degree production as well as the number, work activities, sector of employment, and other economic and demographic characteristics of scientists and engineers—are developed by the Division of Science Resources Studies as part of its ongoing programs. This section presents a brief examination of the major NSF data resources used in this report.

SCIENCE AND ENGINEERING PERSONNEL

Estimates of the characteristics of scientists and engineers in the United States were produced by NSF's Scientific and Technical Personnel Data System (STPDS). Broadly speaking, a person who meets at least two of the following criteria is considered a scientist or engineer:

(1) The person has a degree in science (including social science) or engineering.

(2) The person is employed in a science or engineering occupation.

(3) The person is professionally identified as a scientist or engineer based on his or her total education and experience.

National Estimates

The STPDS comprises three subsystems, each designed to measure the characteristics of a particular subpopulation:

- *The Experienced Sample of Scientists and Engineers* is the biennial followup survey to the 1982 Postcensal Survey of Scientists and Engineers. The Postcensal Survey sample was drawn from those individuals who were in the science and engineering (S&E) population at the time of the 1980 census. The Postcensal Survey and the 1984, 1986, 1989 Experienced Sample surveys were conducted for NSF by the Bureau of the Census.
- *The Survey of Recent Science and Engineering Graduates* is designed to measure the magnitude and characteristics of those who earned S&E degrees after the 1980 decennial census was completed. During the eighties and in 1990, the Institute for Survey Research, Temple University, conducted this survey series for NSF. The most recent survey (1990) focuses on the graduating classes of 1988 and 1989.
- *The Survey of Doctorate Recipients* provides information on scientists and engineers granted doctorates in the United States over a 42-year period. The most recent survey, conducted in 1989, covered those individuals who received their doctorates between 1946 and 1988. Since 1973, this survey series has been conducted biennially for NSF by the Office of Scientific and Engineering Personnel, National Academy of Sciences.

To produce national estimates, data from the Experienced Sample and Recent Graduate surveys are integrated by means of a computer-based model. The Science and Engineering Tabulating (SETAB) Model, developed for NSF by Mathematica Policy Research, Inc., was used to generate national estimates for 1982, 1984, and 1986.

Many of the data on employment characteristics of the overall population of scientists and engineers have not been updated since 1986. One of the major surveys needed for generating these estimates is the Experienced Sample of Scientists and Engineers, a panel survey of individuals selected from the 1980 Census. Panel surveys are subject to sample degradation over time; that is, the percentage responding tends to decline. Preliminary evaluation of the 1989 Survey has raised serious questions about the reliability of the results of the survey. The National Science Foundation has, therefore, decided not to publish data from this series pending a more thorough evaluation, which is currently under way.

Selected Variable Definitions

Field of Science and Engineering

Data on field of employment are derived from responses to survey questions that ask the name of the specialty most closely related to the respondent's principal employment. The specialty is chosen from a list provided in each questionnaire. Fields are classified as follows:

- *Physical science*: chemistry, physics, astronomy, and other physical sciences, including metallurgy
- *Mathematical science*: mathematics and statistics

78

- *Computer specialties*
- *Environmental science*: earth, atmospheric, and oceanographic sciences, including geophysics, seismology, and meteorology
- *Life science*: biological, agricultural, and medical sciences, excluding those having to do with patient care
- *Psychology*
- *Social science*: economics, including agricultural economics; sociology; anthropology; and all other social sciences
- *Engineering*: aeronautical/astronautical, chemical, civil, electrical/electronics, materials science, mechanical, nuclear, petroleum, and other engineering

Work Activities

Data on work activities of scientists and engineers represent their primary work activities. These data are derived from responses to survey questions that ask individuals to select from a list of 10 to 15 choices their primary work activities. Work activities are classified as follows:

- *Research and development (R&D)*: basic research; applied research; development; and design of equipment processes and models
- *Management of R&D*: management or administration of research and development
- *General management*: management or administration of activities other than research and development
- *Teaching*: teaching and training
- *Production/inspection*: quality control, testing, evaluation, or inspection; and operations including production, maintenance, construction, installation, and exploration
- *Reporting, statistical work, and computing*: report and technical writing, editing, and information retrieval; statistical work, including survey work, forecasting, and statistical analysis; computer applications

Additional work activities for which information is collected include distribution (sales, traffic, purchasing, customer and public relations), consulting, and other activities.

Statistical Measures

Labor Force Participation Rate

The labor force is defined as those who are employed and those who are seeking employment. The labor force participation rate is the number of those employed and those unemployed expressed as a percentage of the population.

Unemployment Rate

The unemployment rate is the number of those who are unemployed but seeking employment expressed as a percentage of the total labor force.

S&E Underemployment Rate

The S&E underemployment rate is the number of scientists and engineers who are working part-time but seeking full-time jobs, or who are working in non-S&E jobs when S&E jobs would be preferred, expressed as a percentage of the total employed S&E population.

Reliability of Science and Engineering Estimates

Estimates of scientists and engineers are derived from sample surveys and thus are subject to both sampling and nonsampling errors.

Sampling Errors

The sample used for a particular survey is only one of many possible samples of the same size that could have been selected using the same sample design. Even if the same questionnaire and instructions were used, the estimates from each of the samples would differ. The deviation of the estimated sample from the average of all possible samples is defined as "sampling error." The standard error of a survey estimate attempts to provide a measure of this variation. Standard errors are thus indicators of the degree of precision with which a sample estimate approximates the average results for all possible samples.

Nonsampling errors

Nonsampling errors may be attributed to many sources: inability to obtain information about all cases; definitional difficulties; differences in the interpretation of questions; respondents' inability or unwillingness to provide correct information; mistakes in recording or coding information; and other errors in collection, response, processing, coverage, and imputation.

Nonsampling errors are not unique to samples; they can occur in complete canvasses as well. No systematic attempt has been made to identify or approximate the magnitude of nonsampling errors associated with the estimates of scientists and engineers presented in this report.

GRADUATE ENROLLMENT

National estimates of graduate S&E enrollments are from the Annual Survey of Graduate Science and Engineering Students and Postdoctorates, currently conducted for NSF by Quantum Research Corporation. The survey universe is composed of all institutions in the United States with departments or programs offering courses of study at the postbaccalaureate level in any S&E field. Included are medical schools and other specialized institutions offering first-professional doctorates in health-related fields. Surveys are sent to academic departments, which provide information on the students enrolled in programs in the department. Fields included in summary tables from this survey are listed below.

- *Physical science*: chemistry, physics, astronomy, and other physical sciences

- *Mathematical sciences*
- *Computer sciences*
- *Earth, atmospheric, and oceanographic sciences*: atmospheric science, geosciences, and oceanography
- *Agricultural sciences*
- *Biological sciences*: anatomy, biochemistry, biology, biometry/epidemiology, biophysics, botany, cell biology, ecology, entomology, parasitology, genetics, microbiology, nutrition, pathology, pharmacology, physiology, zoology, and other biosciences
- *Psychology*
- *Social science*: agricultural economics, anthropology, economics, geography, history and philosophy of science, linguistics, political science, sociology, sociology/anthropology, and other social sciences
- *Engineering*: aerospace, agricultural, biomedical, chemical, civil, and electrical engineering; engineering science; industrial, mechanical, metallurgical/materials, mining, nuclear, petroleum, and other engineering

EARNED DEGREES

Bachelor's and Master's Degrees

Data on earned degrees in science and engineering at the bachelor's and master's level are collected by the National Center for Education Statistics (NCES) of the U.S. Department of Education through its Other Formal Awards Conferred Survey and Completion Survey. The two surveys are conducted annually as part of the NCES Higher Education General Information Survey and Integrated Postsecondary Education Data System, respectively. These data cover earned degrees conferred in the aggregate United States, which includes the 50 States, the District of Columbia, and outlying territories. Degree data are compiled for the 12-month period from July through the following June. For a list of disciplines included in fields presented in tables on bachelor's and master's degrees, see *Science and Engineering Degrees: 1966-89, A Source Book*, Survey of Science Resources series, National Science Foundation, NSF 91-314, 1990.

Doctorates

Data on doctorates granted in science and engineering are developed from the Survey of Earned Doctorates, which is conducted for NSF by the National Academy of Sciences. These data cover all types of doctoral degrees, with the exception of such first-professional degrees as the J.D. or M.D. Data are collected for the aggregate United States and cover the period from July to the following June. Lists of disciplines included in fields are available in NSF Sources footnoted in tables.

ADDITIONAL INFORMATION ON NATIONAL SCIENCE FOUNDATION DATA SOURCES

A brief description of each survey and copies of the survey instruments may be found in *A Guide to NSF Science Resources Data*. The *Guide* and reports for each survey are available from the Office of the Division Director, Division of Science Resources Studies, National Science Foundation, 1800 G Street N.W., Room L-609, Washington, DC 20550. The survey reports generally include detailed statistical tables and information on the survey methodology.

appendix b

statistical tables

Employment

Table 1. Employed scientists and engineers, by field, sex, and racial/ethnic group: 1978 and 1988 77

Table 2. Employed men and women scientists and engineers, by field and racial/ethnic group: 1986 79

Table 3. Employed doctoral scientists and engineers, by field, sex, and racial/ethnic group: 1979 and 1989 80

Table 4. Employed doctoral scientists and engineers, by field, sex, and racial/ethnic group: 1989 82

Table 5. Full-time employed 1988 and 1989 science and engineering graduates, by degree level, field of degree, sex, and racial/ethnic group: 1990 83

Years of Professional Experience

Table 6. Employed scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1986 85

Table 7. Employed male scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1986 87

Table 8. Employed female scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1986 89

Table 9. Employed doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989 91

Table 10. Employed male doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989 93

Table 11. Employed female doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989 95

Primary Work Activity

Table 12. Employed scientists and engineers, by field, racial/ethnic group, and selected primary work activity: 1986 97

Table 13. Employed male scientists and engineers, by field, racial/ethnic group, and selected primary work activity: 1986 99

Table 14. Employed female scientists and engineers, by field, racial/ethnic group, and selected primary work activity: 1986 101

Academic Personnel

Table 15. Doctoral scientists and engineers in four-year colleges and universities, by field, tenure status, and racial/ethnic group: 1989 103

Table 16. Male doctoral scientists and engineers in four-year colleges and universities, by field, tenure status, and racial/ethnic group: 1989 105

Table 17. Female doctoral scientists and engineers in four-year colleges and universities, by field, tenure status, and racial/ethnic group: 1989 107

Table 18. Doctoral scientists and engineers in four-year colleges and universities, by field, racial/ethnic group, and academic rank: 1989 109

Table 19. Male doctoral scientists and engineers in four-year colleges and universities, by field, racial/ethnic group, and academic rank: 1989 111

Table 20. Female doctoral scientists and engineers in four-year colleges and universities, by field, racial/ethnic group, and academic rank: 1989 113

Employment Characteristics

Table 21. Selected employment characteristics of scientists and engineers, by field, sex, and racial/ethnic group: 1986 115

Table 22. Labor force participation, unemployment, and underemployment rates of doctoral scientists and engineers, by field, sex, and racial/ethnic group: 1989 117

Table 23. Labor force participation and unemployment rates of recent science and engineering graduates, by degree level, field of degree, sex, and racial/ethnic group: 1990 119

Annual Salaries

Table 24. Average annual salaries of scientists and engineers, by field, sex, and racial/ethnic group: 1986 .. 121

Table 25. Median annual salaries of doctoral scientists and engineers, by field, sex, and racial/ethnic group: 1989 122

Table 26. Median annual salaries of recent science and engineering graduates, by field of degree, sex, and racial/ethnic group: 1990 123

Table 72. Median annual salaries of doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989 182

Table 73. Median annual salaries of doctoral scientists and engineers, by field, sex, and years of professional experience: 1989 184

Precollege Preparation

Table 27. Performance on the mathematics assessment, by age level, sex, and racial/ethnic group: 1973, 1978, 1982, 1986, and 1990 124

Table 28. Performance on the science assessment, by age level, sex, and racial/ethnic group: 1973, 1977, 1982, 1986, and 1990 125

Table 29. Percentage of college-bound seniors who took natural science, social science, or mathematics in high school, by sex and racial/ethnic group: 1991 126

Table 30. Scholastic Aptitude Test (SAT) scores, by sex and racial/ethnic group: 1981-91 127

Table 31. Percentage distribution of scores and means on the Scholastic Aptitude Test, by sex and racial/ethnic group: 1991 128

Table 32. Achievement test scores in science and mathematics for college-bound seniors, by sex and racial/ethnic group: 1991 129

Table 33. Average advanced placement test grades in science and math fields, by sex and racial/ethnic group: 1990 130

Table 34. Intended undergraduate majors and corresponding Scholastic Aptitude Test (SAT) mathematics scores of college-bound seniors, by field, sex, and racial/ethnic group: 1991 131

Undergraduate Education

Table 35. Selected characteristics of American freshmen, by sex and racial/ethnic group: 1980 and 1990 [Percentages] 132

Table 36. Career choices of American freshmen, by sex and racial/ethnic group: 1980 and 1990 134

Table 37. Graduate Record Examination scores by undergraduate major, sex, and racial/ethnic group: 1979 and 1987 135

Table 38. Total science and engineering bachelor's degree recipients, by field: 1979-89 137

Table 39. Male science and engineering bachelor's degree recipients, by field: 1979-89 138

Table 40. Female science and engineering bachelor's degree recipients, by field: 1979-89 139

Table 41. Science and engineering bachelor's degree recipients, by field of degree and racial/ethnic group: 1979, 1981, 1985, 1987, and 1989 ... 140

Table 71. Recipients of bachelor's and master's degrees in engineering, by field of engineering, sex, and race/ethnicity: 1989-90 181

Graduate Education

Table 42. Total graduate enrollment in science and engineering, by field: 1982-90 143

Table 43. Male graduate enrollment in science and engineering, by field: 1982-90 144

Table 44. Female graduate enrollment in science and engineering, by field: 1982-90 145

Table 45. Graduate enrollment in science and engineering, by field, enrollment status, and sex: 1990 146

Table 46. Graduate enrollment in science and engineering of U.S. citizens, by field and racial/ethnic group: 1983 and 1990 147

Table 47. Median elapsed time (in years) between baccalaureate and completion of doctorate, by field, year of doctorate and sex: 1980-90 148

Table 48. Total science and engineering master's degree recipients, by field of degree: 1979-89 150

Table 49. Male science and engineering master's degree recipients, by field of degree: 1979-89 151

Table 50. Female science and engineering master's degree recipients, by field of degree: 1979-89 152

Table 51. Science and engineering master's degree recipients, by field of degree and racial/ethnic group: 1979, 1981, 1985, 1987, and 1989 . . . 153

Table 52. Total science and engineering doctorate recipients, by field of doctorate: 1979-89 156

Table 53. Male science and engineering doctorate recipients, by field of doctorate: 1979-89 157

Table 54. Female science and engineering doctorate recipients, by field of doctorate: 1979-89 158

Table 55. Science and engineering doctorate recipients, by field of doctorate and sex—total: 1980-90 . . . 159

Table 56. Science and engineering doctorate recipients, by field of doctorate and sex—U.S. citizens: 1980-90 160

Table 57. Science and engineering doctorate recipients, by field of doctorate and sex—non-U.S. citizens, permanent residents: 1980-90 161

Table 58. Science and engineering doctorate recipients, by field of doctorate and sex—non-U.S. citizens, temporary residents: 1980-90 162

Table 59. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group—total: 1980-90 163

Table 60. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group—U.S. citizens: 1980-90 165

Table 61. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group—non-U.S. citizens, permanent residents: 1980-90 . 167

Table 62. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group—non-U.S. citizens, temporary residents: 1980-90 . . 169

Table 63. Primary source of support for U.S. citizen doctorate holders in science and engineering fields, by sex and race/ethnicity: 1990 171

Table 64. National Science Foundation fellowships in science and engineering, by field and sex: fiscal year 1975 173

Table 65. National Science Foundation fellowships in science and engineering, by field and sex: fiscal year 1985 174

Table 66. National Science Foundation fellowships in science and engineering, by field and sex: fiscal year 1990 175

Table 67. National Science Foundation minority fellowships in science and engineering, by field and sex: fiscal year 1980 176

Table 68. National Science Foundation minority fellowships in science and engineering, by field and sex: fiscal year 1985 177

Table 69. National Science Foundation minority fellowships in science and engineering, by field and sex: fiscal year 1990 178

Postdoctoral Appointments

Table 70. Postdoctoral scientists and engineers, by field, sex, and racial/ethnic group: 1977, 1983, 1985, 1987, and 1989 179

Persons with Disabilities

Table 74. Selected characteristics of scientists and engineers with physical disabilities: 1986 185

Table 75. Self-identified physical impairments of science and engineering graduates, by type and degree level 186

Table 76. Postsecondary students, by major field of study and disability status: fall 1986 187

Table 1. Employed scientists and engineers, by field, sex, and racial/ethnic group: 1978 and 1988

Page 1 of 2

Field	1978							
	Total (1)	Male	Female	White	Black	Asian	Native American	Hispanic (2)
Total, scientists and engineers	2,609,800	2,367,600	242,200	2,416,500	47,700	108,800	NA	NA
Scientists, total	1,071,000	857,600	213,400	989,800	26,900	38,800	NA	NA
Physical scientists	208,300	189,800	18,500	194,500	3,500	8,700	NA	NA
Chemists	143,000	127,900	15,100	132,600	2,900	6,800	NA	NA
Physicists and astronomers	46,400	44,300	2,100	44,300	500	1,200	NA	NA
Other	18,800	17,500	1,300	17,600	100	600	NA	NA
Mathematical scientists	53,700	40,500	13,100	49,400	2,800	1,500	NA	NA
Mathematicians	46,300	35,400	10,900	42,700	2,500	1,100	NA	NA
Statisticians	7,300	5,200	2,200	6,600	300	400	NA	NA
Computer specialists	177,000	136,800	40,200	164,500	3,200	8,400	NA	NA
Environmental scientists	68,900	61,700	7,200	60,400	700	1,900	NA	NA
Earth scientists	54,000	47,900	6,100	49,700	200	1,300	NA	NA
Oceanographers	7,300	6,900	400	3,700	500	100	NA	NA
Atmospheric scientists	7,600	6,900	700	7,000	--	600	NA	NA
Life scientists	244,100	204,500	39,600	229,100	5,700	6,300	NA	NA
Biological scientists	164,000	134,000	30,000	153,100	4,500	4,100	NA	NA
Agricultural scientists	49,600	46,400	3,200	47,500	800	1,100	NA	NA
Medical scientists	30,500	24,000	6,400	28,500	400	1,100	NA	NA
Psychologists	121,700	79,700	42,000	115,300	3,800	700	NA	NA
Social scientists	197,400	144,600	52,800	176,700	7,200	11,300	NA	NA
Economists	62,100	55,000	7,000	56,500	400	4,500	NA	NA
Sociologists and anthropologists	40,900	26,400	14,600	35,400	2,300	1,600	NA	NA
Other	94,400	63,200	31,300	84,700	4,500	5,200	NA	NA
Engineers, total	1,538,800	1,510,000	28,800	1,426,700	20,800	70,000	NA	NA
Aeronautical and astronautical	62,000	61,400	600	57,800	1,000	2,000	NA	NA
Chemical	84,200	81,700	2,500	78,300	300	4,000	NA	NA
Civil	211,700	208,400	3,300	191,300	2,700	14,800	NA	NA
Electrical and electronics	341,500	338,000	3,500	310,700	5,800	20,200	NA	NA
Industrial	NA	NA	NA	NA	NA	NA	NA	NA
Materials	NA	NA	NA	NA	NA	NA	NA	NA
Mechanical	299,300	295,200	4,100	280,200	2,300	12,800	NA	NA
Mining	NA	NA	NA	NA	NA	NA	NA	NA
Nuclear	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum	NA	NA	NA	NA	NA	NA	NA	NA
Other	540,100	525,400	14,700	508,300	8,800	16,200	NA	NA

See explanatory information and SOURCE at end of table.

BEST COPY AVAILABLE

Table 1. Employed scientists and engineers, by field, sex, and racial/ethnic group: 1978 and 1988

Page 2 of 2

Field	1988							
	Total (1)	Male	Female	White	Black	Asian	Native American	Hispanic (2)
Total, scientists and engineers	5,286,400	4,417,400	867,900	4,761,900	139,200	268,100	21,900	95,900
Scientists, total	2,567,800	1,821,500	745,700	2,299,400	94,800	117,100	8,700	43,800
Physical scientists	312,000	265,500	46,500	279,500	6,500	20,600	700	5,200
Chemists	197,000	161,800	35,300	174,600	4,800	15,100	400	3,100
Physicists and astronomers	77,800	72,600	5,200	70,800	900	4,400	300	1,900
Other	37,100	31,100	6,000	34,200	800	1,100	100	300
Mathematical scientists	168,600	123,600	44,900	145,700	9,500	9,200	200	3,900
Mathematicians	145,100	106,400	38,700	125,100	8,900	7,300	200	3,400
Statisticians	23,500	17,300	6,200	20,500	600	1,900	--	400
Computer specialists	708,300	489,300	218,700	625,300	26,000	46,900	400	8,700
Environmental scientists	113,400	101,000	12,300	107,100	1,000	1,600	700	2,100
Earth scientists	94,200	83,000	11,100	89,400	700	1,200	400	1,800
Oceanographers	4,600	3,900	700	3,800	100	100	300	200
Atmospheric scientists	14,600	14,000	500	13,900	100	200	--	100
Life scientists	458,600	330,800	127,800	413,900	9,500	20,100	3,400	10,100
Biological scientists	299,400	210,100	89,300	267,700	7,700	15,200	1,400	7,000
Agricultural scientists	124,000	92,800	31,300	113,600	1,400	2,900	1,900	2,900
Medical scientists	35,200	27,900	7,300	32,500	400	1,900	100	300
Psychologists	275,900	143,900	132,000	256,000	10,100	4,600	1,100	4,700
Social scientists	531,000	367,300	163,700	472,000	32,300	14,200	2,000	9,000
Economists	219,800	174,900	44,900	199,300	8,400	7,000	1,300	4,700
Sociologists and anthropologists	93,900	48,400	45,500	78,400	8,800	3,700	400	2,600
Other	217,300	143,900	73,400	194,400	15,100	3,500	300	1,700
Engineers, total	2,718,600	2,596,000	122,200	2,462,500	44,400	151,000	13,200	52,100
Aeronautical and astronautical	119,400	114,200	5,300	106,900	1,600	9,300	300	1,400
Chemical	148,500	136,000	12,500	136,000	1,700	8,000	600	2,600
Civil	355,900	346,600	9,300	316,100	6,200	25,400	900	7,100
Electrical and electronics	640,900	616,900	23,800	570,700	11,000	44,000	2,800	13,600
Industrial	172,300	160,900	11,400	160,300	3,100	5,000	1,200	3,400
Materials	65,600	61,800	3,700	59,300	600	4,400	400	800
Mechanical	497,800	480,900	16,900	455,700	7,100	26,300	2,100	8,500
Mining	21,300	20,300	900	20,600	--	500	--	200
Nuclear	29,000	27,800	1,200	26,400	500	2,000	--	100
Petroleum	37,400	35,300	2,100	34,500	400	400	900	800
Other	630,400	595,200	35,100	575,900	12,300	25,800	4,100	13,600

NA = not available; double dashes (--) represent too few cases to estimate.

(1) Racial/ethnic categories will not sum to total because
    (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
    (b) total employed includes "other" and "no report" categories.
(2) Includes members of all racial groups

NOTE: Detail may not sum to totals because of rounding.

SOURCE: National Science Foundation, Science Resources Studies Division, Scientific and Technical Personnel Data System (STPDS). Tabulations are published in Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 1, pp. 67-68.

Table 2. Employed men and women scientists and engineers, by field and racial/ethnic group: 1986

Page 1 of 1

Field and sex	Total Employed (1)	White	Black	Asian	Native American	Hispanic (2)
Total, all fields	4,626,500	4,190,400	114,900	226,800	23,600	93,400
Male	3,927,800	3,581,500	80,500	190,500	21,000	73,800
Female	698,600	608,900	34,500	36,300	2,700	19,600
Scientists, total	2,186,300	1,973,100	73,700	94,000	10,300	46,100
Male	1,586,700	1,448,300	43,600	65,000	7,900	29,800
Female	599,600	524,800	30,100	29,000	2,400	16,400
Physical scientists	288,400	261,800	6,200	15,400	1,000	4,800
Male	250,100	230,100	4,500	11,200	1,000	3,900
Female	38,300	31,700	1,700	4,200	--	900
Mathematical scientists	131,000	115,500	6,800	5,900	200	3,100
Male	97,100	85,200	4,500	5,100	100	1,900
Female	33,900	30,300	2,300	800	100	1,200
Computer specialists	562,600	497,100	18,900	36,100	2,200	9,300
Male	400,000	354,100	11,700	27,300	1,800	6,400
Female	162,500	143,000	7,200	8,800	400	2,900
Environmental scientists	111,300	105,800	1,000	2,100	400	1,800
Male	98,400	93,400	900	2,000	400	1,700
Female	12,900	12,400	100	200	100	200
Life scientists	411,800	377,900	8,800	15,000	2,800	9,900
Male	309,000	288,900	5,500	9,400	1,800	5,900
Female	102,800	89,100	3,300	5,600	1,000	4,100
Psychologists	253,500	234,100	9,100	5,200	1,900	5,900
Male	138,400	131,700	3,100	800	1,400	2,700
Female	115,200	102,500	6,000	4,400	500	3,100
Social scientists	427,800	380,800	22,900	14,200	1,700	11,400
Male	293,800	265,000	13,500	9,200	1,300	7,400
Female	134,000	115,800	9,400	5,000	400	4,000
Engineers, total	2,440,100	2,217,300	41,300	132,800	13,300	47,200
Male	2,341,100	2,133,200	36,900	125,500	13,100	44,000
Female	99,000	84,100	4,400	7,300	300	3,200

Double dashes (--) represent too few cases to estimate.

(1) Racial/ethnic categories will not sum to total employed because
  (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
  (b) total employed includes "other" and "no report" categories.
(2) Includes members of all racial groups

NOTE: Detail may not sum to totals because of rounding.

SOURCE: National Science Foundation, Science Resources Studies Division, Scientific and Technical Personnel Data System (STPDS). Tabulations are published in Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 2, p. 69.

Table 3. Employed doctoral scientists and engineers, by field, sex, and racial/ethnic group: 1979 and 1989

Page 1 of 2

Field	1979							
	Total employed (1,2)	Male	Female	White	Black	Asian	Native American	Hispanic (3)
Total, scientists and engineers	314,257	280,857	33,400	285,613	3,235	22,932	397	4,155
Scientists, total	263,915	231,040	32,875	243,581	3,133	15,057	367	3,456
Physical scientists	60,222	57,086	3,136	54,690	403	4,719	103	892
Chemists	39,659	37,098	2,561	35,828	320	3,246	50	572
Physicists and astronomers	20,563	19,988	575	18,862	83	1,473	53	320
Mathematical scientists	15,250	14,104	1,146	13,788	144	1,130	--	213
Mathematicians	12,843	11,865	978	11,746	131	820	--	213
Statisticians	2,407	2,239	168	2,042	--	310	--	--
Computer specialists	6,684	6,318	366	6,072	--	561	--	83
Environmental scientists	14,575	13,968	607	13,869	65	539	--	187
Earth scientists	11,083	10,673	410	10,570	61	394	--	127
Oceanographers	1,662	1,510	152	1,570	--	57	--	50
Atmospheric scientists	1,830	1,785	45	1,729	--	88	--	--
Life scientists	78,857	67,528	11,329	72,012	883	5,417	78	991
Biological scientists	45,617	37,742	7,875	41,477	564	3,282	33	560
Agricultural scientist	12,789	12,499	290	11,876	68	759	26	192
Medical scientists	20,451	17,287	3,164	18,659	251	1,376	--	239
Psychologists	37,848	28,690	9,158	36,551	602	412	55	458
Social scientists	50,479	43,346	7,133	46,599	1,032	2,279	102	632
Economists	13,978	12,978	1,000	12,811	265	779	59	194
Sociologists and anthropologists	10,198	7,648	2,550	9,535	207	316	31	206
Other	26,303	22,720	3,583	24,253	560	1,184	--	232
Engineers, total	50,342	49,817	525	42,032	102	7,875	30	699
Aeronautical and astronautical	2,364	2,340	24	2,122	--	232	--	--
Chemical	6,166	6,117	49	4,953	--	1,200	--	79
Civil	5,157	5,101	56	3,875	--	1,204	--	--
Electrical and electronic	8,597	8,528	69	7,252	--	1,272	--	89
Materials	5,732	5,669	63	4,865	--	813	--	105
Mechanical	5,245	5,213	32	4,057	22	1,165	--	64
Nuclear	2,286	2,265	21	1,986	--	222	--	52
Systems design	4,931	4,847	84	4,293	24	570	--	22
Other	9,864	9,737	127	8,629	28	1,197	--	280

See explanatory information and SOURCE at end of table.

Table 3. Employed doctoral scientists and engineers, by field, sex, and racial/ethnic group: 1979 and 1989
Page 2 of 2

Field	1989							
	Total employed (1,2)	Male	Female	White	Black	Asian	Native American	Hispanic (3)
Total, scientists and engineers	448,643	371,483	77,160	397,623	7,190	41,239	772	8,094
Scientists, total	373,860	299,015	74,845	338,409	6,572	26,618	690	6,820
Physical scientists	70,209	64,139	6,070	61,624	831	7,217	155	1,158
Chemists	45,649	40,742	4,907	39,519	657	5,119	81	720
Physicists and astronomers	24,560	23,397	1,163	22,105	174	2,098	74	438
Mathematical scientists	17,611	15,766	1,845	15,663	198	1,676	--	322
Mathematicians	14,867	13,342	1,525	13,473	163	1,171	--	271
Statisticians	2,744	2,424	320	2,190	35	505	--	51
Computer specialists	19,797	17,493	2,304	17,070	191	2,422	--	351
Environmental scientists	19,787	18,123	1,664	18,178	228	1,338	--	319
Earth scientists	15,138	13,863	1,275	13,839	218	1,042	--	192
Oceanographers	2,460	2,191	269	2,318	--	135	--	60
Atmospheric scientists	2,189	2,069	120	2,021	--	161	--	67
Life scientists	115,833	89,558	26,275	104,302	1,645	9,298	181	1,907
Biological scientists	67,250	51,540	15,710	60,458	851	5,670	61	1,128
Agricultural scientist	16,504	15,283	1,221	15,320	158	972	31	284
Medical scientists	32,079	22,735	9,344	28,524	636	2,656	89	495
Psychologists	60,596	38,754	21,842	57,961	1,364	947	137	1,276
Social scientists	70,027	55,182	14,845	63,611	2,115	3,720	169	1,487
Economists	18,588	16,294	2,294	16,800	340	1,358	70	428
Sociologists and anthropologists	13,529	9,403	4,126	12,567	363	447	40	360
Other	37,910	29,485	8,425	34,244	1,412	1,915	59	699
Engineers, total	74,783	72,468	2,315	59,214	618	14,621	82	1,274
Aeronautical and astronautical	6,367	6,156	211	4,803	165	1,395	--	40
Chemical	7,959	7,744	215	6,004	39	1,899	--	141
Civil	6,951	6,762	189	5,552	79	1,303	--	108
Electrical and electronic	15,088	14,651	437	11,646	118	3,248	31	314
Materials	8,280	7,892	388	6,254	46	1,936	--	45
Mechanical	7,390	7,287	103	5,814	--	1,510	--	104
Nuclear	2,437	2,403	34	1,995	--	416	--	100
Systems design	3,896	3,703	193	3,474	42	364	--	178
Other	16,415	15,870	545	13,672	106	2,550	--	244

Double dashes (--) represent too few cases to estimate; cells with less than 20 cases are not reported.

(1) Includes scientists and engineers who received their doctorates between 1946 and 1988 and were employed full-time or part-time or held postdoctoral appointments in February 1989. All holders of doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa). Field categories represent the specialty most closely related to the respondent's principal employment. Individuals who did not report S&E employment were assigned the specialty of their doctoral degree.

(2) Racial/ethnic categories will not sum to total because
  (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
  (b) total employed includes "other" and "no report" categories.

(3) Includes members of all racial groups

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations

Table 4. Employed doctoral scientists and engineers, by field, sex, and racial/ethnic group: 1989

Page 1 of 1

Field (1) and sex	Total employed (2,3)	White	Black	Native American	Asian	Hispanic (4)
Total, scientists and engineers (4)	448,643	397,623	7,190	772	41,239	8,094
Male	371,483	328,542	4,954	589	35,911	6,412
Female	77,160	69,081	2,236	183	5,328	1,682
Scientists, total	373,860	338,409	6,572	690	26,618	6,820
Male	299,015	271,100	4,370	520	21,772	5,201
Female	74,845	67,309	2,202	170	4,846	1,619
Physical scientists	70,209	61,624	831	155	7,217	1,158
Male	64,139	56,680	734	136	6,230	963
Female	6,070	4,944	97	--	987	195
Mathematical scientists	17,611	15,663	198	--	1,676	322
Male	15,766	14,116	160	--	1,422	292
Female	1,845	1,547	38	--	254	30
Computer/information specialists	19,797	17,070	191	--	2,422	351
Male	17,493	15,033	173	--	2,174	327
Female	2,304	2,037	--	--	248	24
Environmental scientists	19,787	18,178	228	23	1,338	319
Male	18,123	16,612	223	21	1,252	292
Female	1,664	1,566	--	--	86	27
Life scientists	115,833	104,302	1,645	181	9,298	1,907
Male	89,558	81,056	993	112	7,069	1,465
Female	26,275	23,246	652	69	2,229	442
Psychologists	60,596	57,961	1,364	137	947	1,276
Male	38,754	37,470	590	91	490	746
Female	21,842	20,491	774	46	457	530
Social scientists	70,027	63,611	2,115	169	3,720	1,487
Male	55,182	50,133	1,497	138	3,135	1,116
Female	14,845	13,478	618	31	585	371
Engineers, total	74,783	59,214	618	82	14,621	1,274
Male	72,468	57,442	584	69	14,139	1,211
Female	2,315	1,772	34	--	482	63

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in general field categories. Field categories represent the specialty most closely related to the respondent's principal employment. Individuals who did not report S&E employment were assigned the specialty of their doctoral degree.

(2) Includes scientists and engineers who received their doctorates between 1946 and 1988 and were employed full-time or part-time or held postdoctoral appointments in February 1989. All holders of doctorates are included, regardless of citizenship status (i.e, U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).

(3) Racial/ethnic categories will not sum to total employed because
   (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
   (b) total employed includes "other" and "no report" categories.

(4) Includes members of all racial groups

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations, tables B-67 and B-67A

BEST COPY AVAILABLE

Table 5. Full-time employed 1988 and 1989 science and engineering graduates, by degree level, field of degree, sex, and racial/ethnic group: 1990

Page 1 of 2

Field of degree	Bachelor's recipients (1)							
	Total (2)	Male	Female	White	Black	Asian	Native American	Hispanic (3)
Total, science and engineering	485,500	299,000	186,400	396,000	24,100	21,100	3,100	17,200
Sciences, total	358,700	191,100	167,700	293,300	19,100	13,300	2,100	12,100
Physical sciences	16,500	11,100	5,300	13,600	900	800	--	700
Chemistry	9,200	5,300	3,900	7,300	500	600	--	400
Physics and astronomy	4,700	4,100	800	4,100	100	100	--	300
Other	2,600	1,800	600	2,200	200	--	--	--
Mathematics and statistics	26,600	13,700	13,000	21,900	1,300	1,200	200	800
Computer science	62,500	45,800	16,700	48,700	3,300	4,500	400	2,100
Environmental science	4,700	3,500	1,200	4,300	--	100	--	100
Agricultural and biological sciences	69,200	34,600	34,700	56,600	3,000	1,700	400	1,100
Agricultural sciences	24,500	14,900	9,600	21,500	600	400	--	500
Biology	44,700	19,600	25,200	35,200	2,500	1,300	400	700
Psychology	63,300	19,200	44,000	52,000	3,400	1,000	400	2,900
Social sciences	116,000	63,300	52,700	96,100	7,200	3,800	600	4,300
Economics	38,800	27,300	11,600	33,100	1,800	2,000	--	1,500
Sociology and anthropology	26,900	8,900	18,000	21,500	2,600	600	200	600
Other	50,300	27,100	23,200	41,500	3,000	1,200	400	2,300
Engineering, total	126,700	107,900	18,700	102,700	5,000	7,800	900	5,200
Aeronautical and astronautical	5,800	5,300	500	5,200	100	200	--	300
Chemical	6,100	4,000	2,000	4,700	300	300	--	200
Civil	13,200	11,300	1,900	10,800	200	600	100	900
Electrical and electronics	47,900	42,400	5,600	36,200	2,500	5,200	300	1,400
Industrial	11,000	8,700	2,500	9,000	700	300	--	800
Materials	1,300	1,000	300	1,100	--	--	--	--
Mechanical	25,600	22,600	3,100	21,500	800	1,000	400	1,200
Mining	800	600	200	700	--	--	--	--
Nuclear	700	600	200	700	--	--	--	--
Petroleum	900	800	100	800	--	--	--	100
Other	13,400	10,900	2,600	12,100	300	200	--	100

See explanatory information and SOURCE at end of table.

Table 5. Full-time employed 1988 and 1989 science and engineering graduates, by degree level, field of degree, sex, and racial/ethnic group: 1990

Page 2 of 2

Field of degree	Master's recipients (1)							
	Total (2)	Male	Female	White	Black	Asian	Native American	Hispanic (3)
Total, science and engineering	100,600	71,000	29,600	77,000	3,700	10,100	500	3,300
Sciences, total	66,700	41,200	25,500	51,700	2,700	5,600	300	1,900
Physical sciences	5,100	3,700	1,400	4,300	200	400	--	--
Chemistry	2,100	1,200	900	1,600	--	200	--	--
Physics and astronomy	1,800	1,600	100	1,600	--	200	--	--
Other	1,400	900	500	1,100	100	--	--	--
Mathematics and statistics	8,400	5,000	3,400	7,000	200	700	--	200
Computer science	19,400	14,400	5,100	13,700	500	3,100	--	500
Environmental science	4,000	2,800	1,100	3,500	--	100	--	100
Agricultural and biological sciences	11,700	6,000	5,700	9,600	200	700	--	500
Agricultural sciences	4,500	3,000	1,500	3,600	200	300	--	200
Biology	7,200	3,000	4,200	6,000	--	500	--	300
Psychology	4,500	1,700	2,800	3,600	300	200	--	100
Social sciences	13,400	7,700	5,800	10,000	1,200	500	300	500
Economics	3,500	2,500	1,000	2,600	400	200	--	--
Sociology and anthropology	2,300	1,200	1,000	1,500	400	--	200	--
Other	7,600	3,900	3,700	6,000	400	200	--	400
Engineering, total	33,900	29,700	4,200	25,200	1,000	4,500	200	1,400
Aeronautical and astronautical	1,400	1,400	--	1,200	--	100	--	100
Chemical	1,400	1,100	300	1,100	--	200	--	100
Civil	4,200	3,600	600	2,800	200	800	--	200
Electrical and electronics	10,500	9,600	800	7,200	400	1,800	100	300
Industrial	2,200	1,800	400	1,700	100	200	--	200
Materials	1,000	700	300	800	--	200	--	--
Mechanical	6,800	6,300	400	5,300	100	700	--	100
Mining	400	300	--	400	--	--	--	--
Nuclear	200	200	--	200	--	--	--	--
Petroleum	300	300	--	300	--	--	--	--
Other	5,500	4,300	1,200	4,500	100	400	--	300

Double dashes (--) represent too few cases to estimate.

(1) Graduates who received their degrees in academic year 1988 or 1989
(2) Racial and ethnic categories will not sum to total employed because
  (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
  (b) total employed includes "other" and "no report" categories.
(3) Includes members of all racial groups

NOTE: All figures have been rounded to the nearest 100. Detail may not sum to totals because of rounding.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Science, Social Science and Engineering Graduates (Recent Science and Engineering Graduates) unpublished tabulations

Table 6. Employed scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1986

Page 1 of 2

Field and racial/ethnic group	Total employed (1)	Years of professional experience								
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35 and over
Total, scientists and engineers (1)	4,626,500	104,200	584,200	726,700	680,900	625,800	526,500	459,600	359,200	417,400
White	4,190,400	91,600	522,800	646,500	607,200	564,900	469,300	419,700	338,100	402,100
Black	114,900	2,600	18,800	21,700	23,400	14,100	12,600	7,600	5,600	3,100
Asian	226,800	7,500	25,800	38,200	38,400	35,000	32,300	24,500	12,500	7,300
Native American	23,600	300	1,600	2,700	2,400	2,500	5,600	2,900	1,500	3,300
Hispanic (2)	93,400	3,000	18,900	19,500	13,900	13,200	7,800	6,400	3,900	3,800
Scientists, total	2,186,300	73,600	367,700	412,600	354,300	307,400	227,600	155,900	117,200	111,400
White	1,973,100	65,600	328,300	366,400	317,600	280,900	205,500	139,700	109,300	107,100
Black	73,700	1,800	14,400	14,900	15,100	8,800	7,000	4,800	3,200	800
Asian	94,000	4,500	15,100	19,800	15,900	12,400	9,800	9,000	3,800	2,100
Native American	10,300	--	1,200	1,600	600	400	3,200	1,200	700	1,200
Hispanic (2)	46,100	2,000	13,100	10,000	6,400	7,300	2,900	1,500	1,500	600
Physical scientists	288,400	7,400	29,500	33,400	36,700	39,100	40,900	37,500	25,300	31,100
White	261,800	6,800	26,900	29,700	32,400	34,500	36,800	33,700	23,900	30,200
Black	6,200	200	1,200	700	500	1,000	800	900	600	100
Asian	15,400	300	900	2,200	2,200	3,100	2,800	2,300	700	500
Native American	1,000	--	--	100	--	--	400	300	--	200
Hispanic (2)	4,800	--	700	300	700	1,000	600	700	500	200
Mathematical scientists	131,000	2,400	17,100	18,200	17,300	23,100	20,200	13,300	9,000	6,200
White	115,500	2,000	15,400	17,000	14,900	21,200	17,200	10,800	7,000	5,900
Black	6,800	200	300	600	1,300	600	1,300	1,700	600	200
Asian	5,900	200	900	400	500	500	1,300	600	1,300	--
Native American	200	--	100	--	--	--	--	100	--	--
Hispanic (2)	3,100	--	800	500	400	1,200	100	100	--	--
Computer specialists	562,600	13,300	105,400	123,900	115,500	86,500	53,700	29,000	15,800	6,300
White	497,100	11,100	91,400	109,900	102,000	77,700	47,000	26,100	14,900	6,200
Black	18,900	400	3,600	3,500	3,900	2,900	1,900	500	700	100
Asian	36,100	1,500	7,400	8,100	8,900	4,600	2,900	1,900	200	--
Native American	2,200	--	200	200	100	100	1,400	--	--	--
Hispanic (2)	9,300	400	3,000	2,600	1,000	900	900	100	200	--
Environmental scientists	111,300	3,600	16,500	21,500	18,200	10,100	8,200	11,700	8,100	10,300
White	105,800	3,400	15,800	20,200	16,600	9,600	7,800	11,300	7,700	10,200
Black	1,000	--	100	100	700	100	--	100	--	--
Asian	2,100	100	100	200	800	300	300	100	200	--
Native American	400	--	100	100	100	--	--	100	100	100
Hispanic (2)	1,800	100	300	700	100	100	200	200	200	--
Life scientists	411,800	13,800	68,800	81,400	61,400	51,700	38,400	26,800	28,700	28,300
White	377,900	12,200	63,400	72,000	56,100	47,300	36,400	24,200	27,400	27,300
Black	8,800	100	1,000	2,400	2,300	1,200	500	400	400	200
Asian	15,000	1,000	2,400	3,500	2,300	2,400	1,300	1,600	300	200
Native American	2,800	--	200	700	200	--	100	500	500	600
Hispanic (2)	9,900	700	2,900	2,400	1,200	1,200	300	300	500	400
Psychologists	253,500	8,800	38,300	50,100	44,900	39,000	28,500	16,500	12,600	8,200
White	234,100	8,200	36,100	43,600	40,600	36,900	27,100	15,400	12,200	7,900
Black	9,100	200	1,200	1,700	3,600	600	500	1,000	200	100
Asian	5,200	100	200	3,600	300	500	100	100	200	--
Native American	1,900	--	100	300	300	200	700	100	--	300
Hispanic (2)	5,900	200	2,000	1,600	700	1,100	200	--	--	--

See explanatory information and SOURCE at end of table.

BEST COPY AVAILABLE

Table 6. Employed scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1986

Page 2 of 2

Field and racial/ethnic group	Total employed (1)	Years of professional experience								
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35 and over
Social scientists	427,800	24,300	92,200	84,100	60,400	58,000	37,600	21,100	17,700	20,900
White	380,800	21,800	79,400	74,000	55,100	53,700	33,300	18,300	16,100	19,400
Black	22,900	700	6,900	5,900	2,800	2,500	2,100	200	600	100
Asian	14,200	1,400	3,100	1,700	1,000	1,000	1,100	2,400	900	1,300
Native American	1,700	--	500	400	100	--	400	100	100	100
Hispanic (2)	11,400	600	3,200	1,900	2,200	1,900	600	100	100	--
Engineers, total	2,440,100	30,600	216,500	314,100	326,600	318,400	298,800	303,700	242,000	306,000
White	2,217,300	26,000	194,400	280,100	289,600	284,000	263,800	280,000	228,800	295,000
Black	41,300	800	4,500	6,800	8,300	5,300	5,700	2,800	2,400	2,300
Asian	132,800	3,000	10,700	18,400	22,500	22,600	22,500	15,600	8,700	5,200
Native American	13,300	200	400	1,100	1,800	2,100	2,500	1,700	800	2,100
Hispanic (2)	47,200	1,100	5,800	9,500	7,500	5,900	4,900	4,900	2,400	3,200

Double dashes (--) represent too few cases to estimate.

(1) Detail will not add to total employed because
   (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
   (b) total employed includes "other" and "no report" categories.
(2) Includes members of all racial groups

NOTE: All figures have been rounded to the nearest 100. Detail may not sum to totals because of rounding.

SOURCE: National Science Foundation, Science Resources Studies Division, Scientific and Personnel Data System (STPDS), Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 7, pp. 77-78

Table 7. Employed male scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1986

Page 1 of 2

Field and racial/ethnic group	Total employed (1)	Years of professional experience								
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35 and over
Total, scientists and engineers (1)	3,927,800	72,000	396,200	541,700	561,300	557,900	491,100	441,600	346,300	403,800
White	3,581,500	63,200	358,300	487,200	502,700	504,300	437,900	404,600	326,400	389,800
Black	80,500	1,400	10,900	12,900	15,600	12,000	10,600	6,900	4,600	2,900
Asian	190,500	5,800	17,600	26,900	32,700	31,500	30,700	22,800	12,300	6,100
Native American	21,000	200	900	1,700	2,300	2,300	5,600	2,300	1,400	3,300
Hispanic (2)	73,800	2,300	10,700	14,000	11,600	11,800	7,200	6,200	3,900	3,800
Scientists, total	1,586,700	44,600	212,100	258,900	246,800	244,800	195,100	139,900	107,100	99,900
White	1,448,300	39,900	192,000	234,000	223,200	224,800	176,500	126,100	100,100	97,000
Black	43,600	800	7,400	7,400	7,500	7,000	4,900	4,100	2,400	600
Asian	65,000	3,100	8,700	10,400	11,600	9,200	8,600	7,900	3,600	900
Native American	7,900	--	600	700	600	200	3,200	700	700	1,200
Hispanic (2)	29,800	1,300	6,000	5,700	4,500	6,000	2,400	1,400	1,500	500
Physical scientists	250,100	5,200	21,000	24,300	30,800	35,100	38,000	35,700	24,600	29,100
White	230,100	4,900	19,600	22,200	27,500	31,500	34,700	32,200	23,400	28,300
Black	4,500	100	600	600	300	800	500	900	600	100
Asian	11,200	200	500	1,000	1,400	2,400	2,300	2,000	600	500
Native American	1,000	--	--	100	--	--	400	300	--	200
Hispanic (2)	3,900	--	500	200	600	800	400	700	500	200
Mathematical scientists	97,100	1,300	9,300	10,900	11,000	18,800	18,300	11,800	7,900	5,300
White	85,200	1,100	8,000	10,300	9,400	17,200	15,700	9,600	6,600	5,100
Black	4,500	--	200	300	700	400	1,100	1,500	100	--
Asian	5,100	200	800	200	400	300	1,200	600	1,300	--
Native American	100	--	--	--	--	--	--	100	--	--
Hispanic (2)	1,900	--	200	200	100	1,200	100	100	--	--
Computer specialists	400,000	8,500	64,700	80,700	76,700	64,500	47,800	27,400	14,600	5,500
White	354,100	6,900	56,300	71,300	67,000	58,800	42,300	24,600	13,700	5,400
Black	11,700	200	2,100	1,900	2,300	2,000	800	500	700	100
Asian	27,300	1,200	5,000	5,800	7,100	3,200	2,700	1,700	200	--
Native American	1,800	--	--	100	100	100	1,400	--	--	--
Hispanic (2)	6,400	300	1,600	2,000	1,000	200	900	100	200	--
Environmental scientists	98,400	2,800	12,600	17,800	15,900	9,200	7,800	11,600	7,900	10,200
White	93,400	2,700	12,100	16,700	14,300	8,800	7,400	11,200	7,600	10,200
Black	900	--	100	100	600	100	--	--	--	--
Asian	2,000	100	100	100	800	300	300	100	200	--
Native American	400	--	100	--	--	--	--	100	100	100
Hispanic (2)	1,700	100	200	700	100	100	100	200	200	--
Life scientists	309,000	8,300	36,400	54,800	48,400	43,900	33,400	22,200	26,600	26,400
White	288,900	7,200	34,600	50,000	45,200	40,600	31,700	20,700	25,300	25,300
Black	5,500	100	300	1,200	1,500	1,000	400	300	300	200
Asian	9,400	800	800	1,800	1,300	2,000	1,100	1,100	300	200
Native American	1,800	--	--	300	100	--	100	100	500	600
Hispanic (2)	5,900	300	1,000	1,400	800	1,000	200	300	500	400
Psychologists	138,400	3,700	13,700	20,000	24,900	25,900	18,800	12,900	9,600	6,200
White	131,700	3,600	13,000	18,900	23,700	24,600	17,800	12,100	9,300	5,900
Black	3,100	--	400	700	800	300	200	700	100	--
Asian	800	--	--	100	100	200	--	100	200	--
Native American	1,400	--	100	--	300	--	700	100	--	300
Hispanic (2)	2,700	--	800	500	500	800	200	--	--	--

See explanatory information and SOURCE at end of table.

Table 7. Employed male scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1986

Page 2 of 2

Field and racial/ethnic group	Total employed (1)	Years of professional experience								
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35 and over
Social scientists	293,800	15,000	54,400	50,400	39,100	47,400	31,000	18,300	15,700	17,200
White	265,000	13,600	48,500	44,600	36,200	43,300	26,900	15,700	14,200	16,800
Black	13,500	400	3,800	2,600	1,400	2,400	2,000	100	600	100
Asian	9,200	600	1,500	1,400	600	800	1,000	2,300	900	100
Native American	1,300	--	300	200	100	--	400	100	100	100
Hispanic (2)	7,400	600	1,700	700	1,400	1,900	500	100	100	--
Engineers, total	2,341,100	27,300	184,100	282,700	314,500	313,100	296,000	301,600	239,300	303,800
White	2,133,200	23,300	166,300	253,200	279,500	279,500	261,400	278,500	226,300	292,800
Black	36,900	600	3,500	5,500	8,000	5,000	5,700	2,800	2,200	2,300
Asian	125,500	2,700	8,900	16,500	21,100	22,200	22,100	14,900	8,600	5,200
Native American	13,100	200	300	1,000	1,700	2,100	2,500	1,700	800	2,100
Hispanic (2)	44,000	1,000	4,700	8,300	7,000	5,800	4,800	4,900	2,400	3,200

Double dashes (--) represent too few cases to estimate.

(1) Detail will not add to total employed because
   (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
   (b) total employed includes "other" and "no report" categories.
(2) Includes members of all racial groups

NOTE: All figures have been rounded to the nearest 100. Detail may not sum to totals because of rounding.

SOURCE: National Science Foundation, Science Resources Studies Division, Scientific and Personnel Data System (STPDS). Tabulations are published in Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 8, pp. 79-80.

Table 8. Employed female scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1986

Page 1 of 2

Field and racial/ethnic group	Total employed (1)	Years of professional experience								
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35 and over
Total, all fields (1)	698,600	32,200	188,000	185,000	119,600	67,900	35,400	18,000	12,900	13,600
White	608,900	28,400	164,500	159,300	104,500	60,600	31,400	15,000	11,700	12,200
Black	34,500	1,200	7,900	8,700	7,900	2,100	2,100	700	1,000	200
Asian	36,300	1,800	8,200	11,300	5,700	3,500	1,700	1,700	200	1,200
Native American	2,700	100	700	1,000	100	200	--	500	--	--
Hispanic (2)	19,600	700	8,200	5,600	2,300	1,400	600	100	--	100
Scientists, total	599,600	29,000	155,600	153,700	107,500	62,600	32,500	15,900	10,100	11,500
White	524,800	25,700	136,300	132,400	94,400	56,000	29,000	13,600	9,200	10,100
Black	30,100	1,000	6,900	7,400	7,500	1,800	2,100	700	800	200
Asian	29,000	1,400	6,400	9,400	4,300	3,100	1,300	1,000	100	1,200
Native American	2,400	--	600	900	100	200	--	500	--	--
Hispanic (2)	16,400	600	7,100	4,400	1,900	1,300	500	100	--	100
Physical scientists	38,300	2,200	8,400	9,100	5,900	3,900	2,900	1,700	700	2,000
White	31,700	2,000	7,300	7,500	4,900	2,900	2,100	1,400	500	1,900
Black	1,700	100	600	200	200	200	300	--	100	--
Asian	4,200	100	400	1,200	800	700	600	300	100	--
Native American	--	--	--	--	--	--	--	--	--	--
Hispanic (2)	900	--	200	100	200	200	200	--	--	--
Mathematical scientists	33,900	1,100	7,800	7,200	6,300	4,300	1,900	1,500	1,000	900
White	30,300	900	7,300	6,700	5,500	4,000	1,600	1,200	400	700
Black	2,300	200	100	200	600	100	200	200	500	100
Asian	800	--	100	200	200	200	100	--	--	--
Native American	100	--	100	--	--	--	--	--	--	--
Hispanic (2)	1,200	--	600	300	300	--	--	--	--	--
Computer specialists	162,500	4,900	40,600	43,200	38,800	22,000	5,900	1,600	1,200	800
White	143,000	4,200	35,100	38,600	35,000	18,900	4,600	1,500	1,200	800
Black	7,200	200	1,500	1,600	1,700	900	1,100	--	--	--
Asian	8,800	300	2,500	2,300	1,800	1,400	200	100	--	--
Native American	400	--	200	100	--	--	--	--	--	--
Hispanic (2)	2,900	100	1,400	600	--	700	--	100	--	--
Environmental scientists	12,900	800	3,900	3,700	2,400	900	400	100	200	100
White	12,400	800	3,800	3,500	2,300	900	400	100	200	100
Black	100	--	--	--	100	--	--	--	--	--
Asian	200	--	--	100	--	--	--	--	--	--
Native American	100	--	--	--	--	--	--	--	--	--
Hispanic (2)	200	--	100	--	--	--	100	--	--	--
Life scientists	102,800	5,600	32,400	26,600	13,000	7,800	5,000	4,500	2,100	2,000
White	89,100	5,000	28,800	22,100	10,900	6,700	4,700	3,500	2,000	2,000
Black	3,300	--	700	1,200	800	200	100	--	100	--
Asian	5,600	200	1,600	1,700	1,000	400	200	500	--	--
Native American	1,000	--	100	400	--	--	--	400	--	--
Hispanic (2)	4,100	400	2,000	1,000	400	100	100	--	--	100
Psychologists	115,200	5,100	24,600	30,200	20,000	13,100	9,800	3,700	3,000	2,000
White	102,500	4,600	23,200	24,700	16,900	12,300	9,300	3,300	2,900	1,900
Black	6,000	200	800	1,000	2,800	300	400	300	100	100
Asian	4,400	100	200	3,600	200	300	100	--	--	--
Native American	500	--	--	300	--	200	--	--	--	--
Hispanic (2)	3,100	100	1,200	1,200	300	300	100	--	--	--

See explanatory information and SOURCE at end of table.

BEST COPY AVAILABLE

Table 8. Employed female scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1986

Page 2 of 2

Field and racial/ethnic group	Total employed (1)	Years of professional experience								
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35 and over
Social scientists	134,000	9,400	37,700	33,700	21,200	10,600	6,600	2,800	2,000	3,800
White	115,800	8,200	30,900	29,400	19,000	10,400	6,300	2,600	1,900	2,600
Black	9,400	300	3,100	3,300	1,400	100	100	100	100	--
Asian	5,000	800	1,700	300	400	200	100	100	--	1,200
Native American	400	--	200	100	--	--	--	100	--	--
Hispanic (2)	4,000	--	1,600	1,200	800	--	100	--	--	--
Engineers, total	99,000	3,300	32,500	31,300	12,100	5,300	2,900	2,100	2,800	2,200
White	84,100	2,700	28,200	26,900	10,100	4,600	2,400	1,400	2,500	2,200
Black	4,400	100	1,000	1,300	300	300	--	--	100	--
Asian	7,300	300	1,900	1,900	1,400	400	400	700	100	--
Native American	300	--	100	100	100	--	--	--	--	--
Hispanic (2)	3,200	100	1,100	1,200	400	100	100	--	--	--

Double dashes (--) represent too few cases to estimate.

(1) Detail will not add to total employed because
(a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
(b) total employed includes "other" and "no report" categories.
(2) Includes members of all racial groups

NOTE: All figures have been rounded to the nearest 100. Detail may not sum to totals because of rounding.

SOURCE: National Science Foundation, Science Resources Studies Division, Scientific and Personnel Data System (STPDS). Tabulations are published in Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 9, pp. 81-82.

Table 9. Employed doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989

Page 1 of 2

Field (1) and racial/ethnic group	Total employed (2,3,4)	Years of professional experience									
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 and over
Total, scientists and engineers	448,643	14,778	57,109	83,948	80,950	79,494	59,327	31,442	19,504	10,535	2,536
White	397,623	12,318	48,259	72,700	70,708	71,384	54,257	29,000	18,504	10,217	2,488
Black	7,190	312	1,313	1,878	1,694	1,083	415	152	184	--	24
Asian	41,239	1,985	6,998	8,809	8,121	6,672	4,463	2,117	786	253	24
Native American	772	35	190	146	110	115	70	94	--	--	--
Hispanic (5)	8,094	402	1,823	1,955	1,364	1,189	632	322	102	91	--
Scientists, total	373,860	12,398	48,699	71,668	68,735	64,541	46,970	25,846	16,613	8,445	2,118
White	338,409	10,677	42,355	64,101	61,768	58,979	43,320	24,112	15,775	8,210	2,086
Black	6,572	274	1,208	1,710	1,563	924	415	152	168	--	24
Asian	26,618	1,305	4,650	5,382	5,060	4,312	3,043	1,449	655	170	--
Native American	690	31	168	141	68	106	70	94	--	--	--
Hispanic (5)	6,820	299	1,660	1,700	1,069	967	514	257	87	91	--
Physical scientists	70,209	1,896	8,326	10,308	10,647	11,859	10,840	7,218	4,657	2,520	909
White	61,624	1,452	6,689	8,587	9,057	10,503	9,847	6,806	4,451	2,416	901
Black	831	22	178	146	138	166	71	42	66	--	--
Asian	7,217	391	1,367	1,456	1,416	1,140	827	345	140	62	--
Native American	155	--	31	--	--	30	61	--	--	--	--
Hispanic (5)	1,158	70	289	161	117	250	196	50	--	--	--
Mathematical scientists	17,611	453	1,715	2,841	2,824	3,383	3,205	1,702	605	407	136
White	15,663	350	1,407	2,419	2,523	3,008	2,986	1,515	595	407	136
Black	198	--	46	31	42	33	42	--	--	--	--
Asian	1,676	101	247	391	239	334	160	171	--	--	--
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic (5)	322	--	123	80	30	35	--	33	--	--	--
Computer specialists	19,797	565	2,358	3,911	4,444	4,007	2,334	983	469	156	29
White	17,070	492	1,717	3,067	4,020	3,673	2,080	915	469	156	29
Black	191	--	--	152	--	--	--	--	--	--	--
Asian	2,422	63	611	653	383	304	254	68	--	--	--
Native American	18	--	--	--	--	--	--	--	--	--	--
Hispanic (5)	351	--	38	65	71	83	--	--	--	--	--
Environmental scientists	19,787	516	2,110	3,965	3,518	3,613	3,048	1,362	793	519	130
White	18,178	462	1,898	3,547	3,185	3,416	2,791	1,309	725	503	130
Black	228	--	--	151	52	--	--	--	--	--	--
Asian	1,338	49	192	257	270	185	257	44	68	--	--
Native American	23	--	--	--	--	--	--	--	--	--	--
Hispanic (5)	319	30	33	65	78	88	--	--	--	--	--
Life scientists	115,833	4,674	16,596	23,042	21,127	18,676	13,350	7,603	5,361	2,550	350
White	104,302	3,955	14,605	20,995	18,947	16,612	12,213	6,941	5,068	2,435	342
Black	1,645	100	321	344	378	256	106	62	24	--	--
Asian	9,298	535	1,553	1,593	1,739	1,704	993	580	261	92	--
Native American	181	--	63	35	--	30	--	20	--	--	--
Hispanic (5)	1,907	91	463	380	235	302	234	91	56	25	--
Psychologists	60,596	2,218	8,950	14,388	11,574	9,496	5,955	3,137	2,399	1,038	181
White	57,961	2,082	8,443	13,605	10,922	9,131	5,810	3,124	2,364	1,038	166
Black	1,364	67	275	444	332	127	60	--	--	--	--
Asian	947	66	146	269	202	148	81	--	--	--	--
Native American	137	--	30	44	24	30	--	--	--	--	--
Hispanic (5)	1,276	55	325	341	264	120	37	42	--	36	--

See explanatory information and SOURCE at end of table.

Table 9. Employed doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989

Page 2 of 2

Field (1) and racial/ethnic group	Total employed (2,3,4)	Years of professional experience									
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 and over
Social scientists	70,027	2,076	8,644	13,213	14,601	13,567	8,238	3,841	2,329	1,255	383
White	63,611	1,884	7,596	11,881	13,114	12,636	7,593	3,502	2,103	1,255	382
Black	2,115	73	360	442	612	335	136	32	64	--	--
Asian	3,720	100	534	763	811	497	471	237	162	--	--
Native American	169	--	33	32	--	--	--	70	--	--	--
Hispanic (5)	1,487	33	389	608	274	89	30	32	--	--	--
Engineers, total	74,783	2,380	8,410	12,280	12,215	14,953	12,357	5,596	2,891	2,090	418
White	59,214	1,641	5,904	8,599	8,940	12,405	10,937	4,888	2,729	2,007	402
Black	618	38	105	168	131	159	--	--	--	--	--
Asian	14,621	680	2,348	3,427	3,061	2,360	1,420	668	131	83	--
Native American	82	--	22	--	42	--	--	--	--	--	--
Hispanic (5)	1,274	103	163	255	295	222	118	65	--	--	--

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in the general field categories.
(2) Includes scientists and engineers who received their doctorates between 1946 and 1988 and were employed full-time or part-time or held postdoctoral appointments in February 1989. All holders of doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).
(3) "Years of professional experience" categories will not sum to total employed scientists and engineers because the total includes "no reports."
(4) Racial/ethnic categories will not sum to total employed doctoral scientists and engineers because
(a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
(b) total employed includes "other" and "no report" categories.
(5) Includes members of all racial groups

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations, tables B-66 and B-66A

BEST COPY AVAILABLE

Table 10. Employed male doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989

Page 1 of 2

Field (1) and racial/ethnic group	Total employed (2,3,4)	Years of professional experience									
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 and over
Total, scientists and engineers	371,483	9,983	40,079	61,736	66,222	70,246	55,316	29,665	18,538	10,134	2,442
White	328,542	8,095	33,185	52,709	57,653	62,996	50,548	27,417	17,582	9,827	2,395
Black	4,954	172	792	1,152	1,184	893	338	143	184	--	23
Asian	35,911	1,587	5,769	7,445	7,037	6,027	4,242	1,936	749	249	24
Native American	589	26	85	108	90	112	70	90	--	--	--
Hispanic (5)	6,412	247	1,259	1,492	1,131	1,053	608	300	64	82	11
Scientists, total	299,015	7,783	32,337	50,184	54,438	55,472	43,010	24,099	15,650	8,048	2,024
White	271,100	6,600	27,786	44,696	49,030	50,723	39,647	22,548	14,856	7,824	1,993
Black	4,370	137	690	1,002	1,061	735	338	143	168	--	23
Asian	21,772	938	3,565	4,142	4,072	3,713	2,837	1,279	618	166	--
Native American	520	22	69	103	55	103	70	90	--	--	--
Hispanic (5)	5,201	156	1,110	1,266	844	831	490	235	49	82	--
Physical scientists	64,139	1,590	6,910	8,790	9,568	11,113	10,443	7,009	4,489	2,438	899
White	56,680	1,207	5,581	7,338	8,217	9,896	9,497	6,626	4,292	2,338	891
Black	734	12	144	127	118	155	68	42	66	--	--
Asian	6,230	343	1,101	1,220	1,209	1,012	783	316	131	58	--
Native American	136	--	26	--	--	30	61	--	--	--	--
Hispanic (5)	963	39	221	121	93	227	192	50	--	--	--
Mathematical scientists	15,766	395	1,412	2,361	2,437	3,110	3,027	1,616	581	397	130
White	14,116	308	1,162	2,014	2,175	2,777	2,851	1,454	571	397	130
Black	160	--	39	22	38	27	32	--	--	--	--
Asian	1,422	85	200	325	204	300	127	148	--	--	--
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic (5)	292	--	114	70	27	35	--	32	--	--	--
Computer specialists	17,493	436	1,925	3,196	3,799	3,756	2,281	976	453	155	29
White	15,033	392	1,338	2,425	3,450	3,447	2,027	908	453	155	29
Black	173	--	--	142	--	--	--	--	--	--	--
Asian	2,174	39	560	590	309	279	254	68	--	--	--
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic (5)	327	--	34	55	65	83	--	--	--	--	--
Environmental scientists	18,123	408	1,680	3,483	3,214	3,420	2,977	1,353	778	518	126
White	16,612	358	1,482	3,103	2,907	3,233	2,722	1,304	710	502	126
Black	223	--	--	149	49	--	--	--	--	--	--
Asian	1,252	46	181	221	249	176	255	40	68	--	--
Native American	21	--	--	--	--	--	--	--	--	--	--
Hispanic (5)	292	27	27	59	68	86	--	--	--	--	--
Life scientists	89,558	2,734	10,648	15,704	16,287	15,622	11,965	6,915	5,041	2,414	298
White	81,056	2,246	9,329	14,399	14,773	13,912	10,939	6,363	4,776	2,306	290
Black	993	45	179	155	221	196	84	60	24	--	--
Asian	7,069	381	1,076	1,071	1,255	1,420	904	472	233	92	--
Native American	112	--	--	--	--	30	--	20	--	--	--
Hispanic (5)	1,465	41	297	293	196	271	225	75	33	--	--
Psychologists	38,754	876	4,252	7,563	7,571	7,005	4,779	2,690	2,136	946	181
White	37,470	829	4,068	7,251	7,152	6,834	4,691	2,686	2,108	946	166
Black	590	33	90	146	177	62	37	--	--	--	--
Asian	490	--	75	112	141	79	51	--	--	--	--
Native American	91	--	--	36	21	30	--	--	--	--	--
Hispanic (5)	746	24	133	157	198	90	33	37	--	36	--

See explanatory information and SOURCE at end of table.

Table 10. Employed male doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989

Page 2 of 2

Field (1) and racial/ethnic group	Total employed (2,3,4)	Years of professional experience									
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 and over
Social scientists	55,182	1,344	5,510	9,087	11,562	11,446	7,538	3,540	2,172	1,180	361
White	50,133	1,260	4,826	8,166	10,356	10,624	6,920	3,207	1,946	1,180	361
Black	1,497	40	212	261	450	288	117	32	64	--	--
Asian	3,135	30	372	603	705	447	463	231	162	--	--
Native American	138	--	--	22	--	--	--	70	--	--	--
Hispanic (5)	1,116	--	284	511	197	39	27	32	--	--	--
Engineers, total	72,468	2,200	7,742	11,552	11,784	14,774	12,306	5,566	2,888	2,086	418
White	57,442	1,495	5,399	8,013	8,623	12,273	10,901	4,869	2,726	2,003	402
Black	584	35	102	150	123	158	--	--	--	--	--
Asian	14,139	649	2,204	3,303	2,965	2,314	1,405	657	131	83	--
Native American	69	--	--	--	35	--	--	--	--	--	--
Hispanic (5)	1,211	91	149	226	287	222	118	65	--	--	--

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in the general field categories.
(2) Includes scientists and engineers who received their doctorates between 1946 and 1988 and were employed full-time or part-time or held postdoctoral appointments in February 1989. All holders of doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).
(3) "Years of professional experience" categories will not sum to total employed scientists and engineers because the total includes "no reports."
(4) Racial/ethnic categories will not sum to total employed doctoral scientists and engineers because
   (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
   (b) total employed includes "other" and "no report" categories.
(5) Includes members of all racial groups

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations, tables B-66 and B-66A

Table 11. Employed female doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989

Page 1 of 2

Field (1) and racial/ethnic group	Total employed (2,3,4)	Years of professional experience									
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 and over
Total, scientists and engineers	77,160	4,795	17,030	22,212	14,728	9,248	4,011	1,777	966	401	94
White	69,081	4,223	15,074	19,991	13,055	8,388	3,709	1,583	922	390	93
Black	2,236	140	521	726	510	190	77	--	--	--	--
Asian	5,328	398	1,229	1,364	1,084	645	221	181	37	--	--
Native American	183	--	105	38	20	--	--	--	--	--	--
Hispanic (5)	1,682	155	564	463	233	136	24	22	38	--	--
Scientists, total	74,845	4,615	16,362	21,484	14,297	9,069	3,960	1,747	963	397	94
White	67,309	4,077	14,569	19,405	12,738	8,256	3,673	1,564	919	386	93
Black	2,202	137	518	708	502	189	77	--	--	--	--
Asian	4,846	367	1,085	1,240	988	599	206	170	37	--	--
Native American	170	--	99	38	--	--	--	--	--	--	--
Hispanic (5)	1,619	143	550	434	225	136	24	22	38	--	--
Physical scientists	6,070	306	1,416	1,518	1,079	746	397	209	168	82	--
White	4,944	245	1,108	1,249	840	607	350	180	159	78	--
Black	97	--	34	--	20	--	--	--	--	--	--
Asian	987	48	266	236	207	128	44	29	--	--	--
Native American	--	--	--	--	10	--	--	--	--	--	--
Hispanic (5)	195	31	68	40	24	23	--	--	--	--	--
Mathematical scientists	1,845	58	303	480	387	273	178	86	24	--	--
White	1,547	42	245	405	348	231	135	61	24	--	--
Black	38	--	--	--	--	--	--	--	--	--	--
Asian	254	--	47	66	35	34	33	23	--	--	--
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic (5)	30	--	--	--	--	--	--	--	--	--	--
Computer specialists	2,304	129	433	715	645	251	53	--	--	--	--
White	2,037	100	379	642	570	226	53	--	--	--	--
Black	--	--	--	--	--	--	--	--	--	--	--
Asian	248	24	51	63	74	25	--	--	--	--	--
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic (5)	24	--	--	--	--	--	--	--	--	--	--
Environmental scientists	1,664	108	430	482	304	193	71	--	--	--	--
White	1,566	104	416	444	278	183	69	--	--	--	--
Black	--	--	--	--	--	--	--	--	--	--	--
Asian	86	--	--	36	21	--	--	--	--	--	--
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic (5)	27	--	--	--	--	--	--	--	--	--	--
Life scientists	26,275	1,940	5,948	7,338	4,840	3,054	1,385	688	320	136	52
White	23,246	1,709	5,276	6,596	4,174	2,700	1,274	578	292	129	52
Black	652	55	142	189	157	60	22	--	--	--	--
Asian	2,229	154	477	522	484	284	89	108	28	--	--
Native American	69	--	45	--		--	--	--	--	--	--
Hispanic (5)	442	50	166	87	39	31	--	--	23	--	--
Psychologists	21,842	1,342	4,698	6,825	4,003	2,431	1,176	447	263	92	--
White	20,491	1,253	4,375	6,354	3,770	2,297	1,119	438	256	92	--
Black	774	34	185	298	155	65	23	--	--	--	--
Asian	457	52	71	157	61	69	30	--	--	--	--
Native American	46	--	26	--	--	--	--	--	--	--	--
Hispanic (5)	530	31	192	184	66	30	--	--	--	--	--

See explanatory information and SOURCE at end of table.

Table 11. Employed female doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989

Page 2 of 2

Field (1) and racial/ethnic group	Total employed (2,3,4)	Years of professional experience									
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 and over
Social scientists	14,845	732	3,134	4,126	3,039	2,121	700	301	157	75	22
White	13,478	624	2,770	3,715	2,758	2,012	673	295	157	75	21
Black	618	33	148	181	162	47	--	--	--	--	--
Asian	585	70	162	160	106	50	--	--	--	--	--
Native American	31	--	--	--	--	--	--	--	--	--	--
Hispanic (5)	371	24	105	97	77	50	--	--	--	--	--
Engineers, total	2,315	180	668	728	431	179	51	30	--	--	--
White	1,772	146	505	586	317	132	36	--	--	--	--
Black	34	--	--	--	--	--	--	--	--	--	--
Asian	482	31	144	124	96	46	--	--	--	--	--
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic (5)	63	--	--	29	--	--	--	--	--	--	--

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in the general field categories.
(2) Includes scientists and engineers who received their doctorates between 1946 and 1988 and were employed full-time or part-time or held postdoctoral appointments in February 1989. All holders of doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).
(3) "Years of professional experience" categories will not sum to total employed scientists and engineers because the total includes "no reports."
(4) Racial/ethnic categories will not sum to total employed doctoral scientists and engineers because
 (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
 (b) total employed includes "other" and "no report" categories.
(5) Includes members of all racial groups

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations, tables B-66 and B-66A

BEST COPY AVAILABLE

Table 12. Employed scientists and engineers, by field, racial/ethnic group, and selected primary work activity: 1986

Page 1 of 2

Field and racial/ethnic group	Total employed (1)	Research	Development	Management of R&D	General management	Teaching	Production/ inspection	Reporting, statistical work and computing
Total, all fields (2)	4,626,500	393,500	875,500	398,600	883,600	357,800	582,600	472,800
White	4,190,400	355,000	780,800	366,800	810,600	325,100	526,000	422,900
Black	114,900	6,800	15,400	7,300	25,700	10,800	15,000	15,200
Asian	226,800	23,300	60,800	17,500	32,100	16,900	27,700	25,400
Native American	23,600	1,200	3,700	2,500	4,600	700	3,900	1,800
Hispanic (3)	93,400	8,100	15,300	6,300	17,700	7,400	13,700	10,300
Scientists, total	2,186,300	291,500	182,200	162,600	383,000	300,800	159,000	359,600
White	1,973,100	263,900	161,400	148,200	345,300	274,300	140,200	322,000
Black	73,700	5,700	3,800	3,800	18,600	10,200	5,300	12,100
Asian	94,000	15,900	13,400	6,200	12,800	12,300	8,200	19,000
Native American	10,300	900	200	1,700	1,800	700	1,500	1,200
Hispanic	46,100	5,700	3,300	3,100	8,800	6,200	3,300	7,400
Physical scientists	288,400	70,500	44,700	43,000	30,500	45,800	32,200	6,900
White	261,800	62,600	39,800	39,400	28,800	43,700	27,300	6,500
Black	6,200	1,500	1,000	600	900	400	1,200	200
Asian	15,400	4,900	3,400	1,400	400	1,400	3,400	100
Native American	1,000	400	--	700	--	--	--	--
Hispanic	4,800	1,700	900	500	700	300	300	300
Mathematical scientists	131,000	12,000	6,000	14,700	21,000	46,600	5,100	16,500
White	115,500	11,200	5,500	13,500	18,800	38,900	4,200	14,800
Black	6,800	200	300	700	900	3,400	400	700
Asian	5,900	400	100	200	300	3,300	500	800
Native American	200	--	--	--	100	100	--	--
Hispanic	3,100	100	100	--	800	1,400	--	300
Computer specialists	562,600	15,000	97,800	32,800	54,000	19,600	20,500	271,300
White	497,100	12,400	85,500	29,800	47,000	17,600	16,800	241,400
Black	18,900	200	1,800	700	3,600	200	1,400	9,000
Asian	36,100	2,200	8,500	1,900	2,800	1,200	1,900	15,900
Native American	2,200	--	--	200	400	--	--	1,200
Hispanic	9,300	100	1,300	300	800	400	200	5,100
Environmental scientists	111,300	29,900	6,400	7,500	14,300	9,200	23,800	6,800
White	105,800	28,300	6,200	7,200	13,400	8,800	22,300	6,500
Black	1,000	100	--	--	600	--	100	100
Asian	2,100	1,100	200	--	100	200	300	200
Native American	400	100	--	100	--	100	100	--
Hispanic	1,800	300	100	--	200	400	400	100
Life scientists	411,800	112,700	15,700	30,100	80,100	61,500	44,000	13,300
White	377,900	101,700	14,000	27,100	74,500	57,900	40,700	12,000
Black	8,800	2,700	300	600	2,200	1,400	500	400
Asian	15,000	5,700	1,000	1,700	1,500	1,600	1,600	100
Native American	2,800	200	--	700	1,000	200	300	--
Hispanic	9,900	3,100	300	600	1,700	800	1,200	200
Psychologists	253,500	17,400	3,200	9,500	56,500	39,100	11,000	5,300
White	234,100	16,300	3,000	8,800	50,400	37,200	9,000	4,900
Black	9,100	500	--	500	2,300	1,100	500	200
Asian	5,200	300	--	200	3,500	200	--	200
Native American	1,900	--	--	--	--	300	600	--
Hispanic	5,900	300	--	--	1,100	600	1,000	200

See explanatory information and SOURCE at end of table.

Table 12. Employed scientists and engineers, by field, racial/ethnic group, and selected primary work activity: 1986

Page 2 of 2

Field and racial/ethnic group	Total employed (1)	Research	Development	Management of R&D	General management	Teaching	Production/ inspection	Reporting, statistical work and computing
Social scientists	427,800	33,800	8,500	25,200	126,600	79,000	22,500	39,500
White	380,800	31,300	7,400	22,400	112,300	70,200	19,900	36,000
Black	22,900	500	300	900	8,100	3,800	1,200	1,400
Asian	14,200	1,300	100	800	4,300	4,300	600	1,700
Native American	1,700	200	--	--	200	100	600	--
Hispanic	11,400	100	400	1,700	3,400	2,300	200	1,200
Engineers, total	2,440,100	102,000	693,200	236,000	500,600	56,900	423,600	113,200
White	2,217,300	91,100	619,400	218,700	465,400	50,800	385,700	100,800
Black	41,300	1,100	11,700	3,500	7,100	600	9,700	3,200
Asian	132,800	7,500	47,400	11,400	19,300	4,600	19,500	6,400
Native American	13,300	200	3,500	800	2,800	--	2,500	600
Hispanic	47,200	2,400	12,000	3,200	9,000	1,100	10,400	2,900

Double dashes (--) represent too few cases to estimate.

(1) Includes "consulting," "other," and "no report" categories.
(2) Detail will not add to total employed because
    (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
    (b) total employed includes "other" and "no report" categories.
(3) Includes members of all racial groups

NOTE: All figures have been rounded to the nearest 100. Detail may not sum to totals because of rounding.

SOURCE: National Science Foundation, Science Resources Studies Division, Scientific and Personnel Data System (STPDS). Tabulations are published in Women and Minorities in Science and Engineering, NSF 90-301, January, 1990, appendix B, table 13, pp. 89-92.

Table 13. Employed male scientists and engineers, by field, racial/ethnic group, and selected primary work activity: 1986

Page 1 of 2

Field and racial/ethnic group	Total employed (1)	Research	Development	Management of R&D	General management	Teaching	Production/ inspection	Reporting, statistical work and computing
Total, all fields (2)	3,927,800	314,400	802,300	367,200	781,100	276,300	529,000	341,100
White	3,581,500	285,200	717,800	339,300	724,000	251,500	480,900	308,500
Black	80,500	4,200	13,500	5,300	19,300	8,000	11,600	8,100
Asian	190,500	18,600	55,600	15,800	25,800	14,300	24,000	17,200
Native American	21,000	1,000	3,600	2,500	3,700	500	3,900	1,600
Hispanic (3)	73,800	5,800	13,200	6,100	14,800	3,900	12,200	7,900
Scientists, total	1,586,700	221,300	141,300	135,500	289,400	223,300	124,400	237,200
White	1,448,300	202,200	126,200	124,000	266,200	203,900	111,500	214,800
Black	43,600	3,100	2,600	1,900	12,700	7,400	3,000	6,300
Asian	65,000	11,600	10,400	5,200	7,100	10,200	5,600	11,500
Native American	7,900	800	100	1,700	1,000	400	1,400	1,100
Hispanic	29,800	3,700	2,200	3,000	6,200	2,800	2,500	5,200
Physical scientists	250,100	60,900	39,700	40,900	27,300	39,000	24,100	5,700
White	230,100	54,400	36,000	37,500	25,900	37,300	21,600	5,500
Black	4,500	1,200	600	500	900	300	700	200
Asian	11,200	4,000	2,600	1,300	200	1,300	1,500	--
Native American	1,000	400	--	700	--	--	--	--
Hispanic	3,900	1,500	700	400	700	100	200	300
Mathematical scientists	97,100	10,400	4,700	12,200	16,300	33,800	3,500	10,900
White	85,200	9,700	4,400	11,600	14,300	27,300	3,100	9,800
Black	4,500	100	200	100	800	2,700	--	400
Asian	5,100	300	100	100	300	3,100	400	600
Native American	100	--	--	--	--	100	--	--
Hispanic	1,900	100	100	--	800	700	--	100
Computer specialists	400,000	11,200	72,400	27,200	43,300	12,800	15,900	180,700
White	354,100	8,900	63,600	24,700	37,800	11,500	12,700	161,900
Black	11,700	100	1,200	500	2,600	--	1,100	4,500
Asian	27,300	2,000	6,900	1,700	2,500	1,100	1,700	10,300
Native American	1,800	--	--	200	400	--	--	1,100
Hispanic	6,400	100	600	200	700	100	200	3,800
Environmental scientists	98,400	25,600	5,600	7,000	13,000	8,300	21,900	5,700
White	93,400	24,100	5,500	6,700	12,000	8,000	20,600	5,500
Black	900	100	--	--	600	--	100	100
Asian	2,000	1,000	100	--	100	200	300	200
Native American	400	100	--	100	--	100	100	--
Hispanic	1,700	200	100	--	200	400	300	100
Life scientists	309,000	80,400	10,600	26,100	67,200	46,700	34,700	8,800
White	288,900	74,100	9,500	23,300	63,600	44,400	32,500	8,200
Black	5,500	1,300	300	400	1,600	1,000	200	300
Asian	9,400	3,300	600	1,700	1,000	1,000	1,200	100
Native American	1,800	200	--	700	500	200	200	--
Hispanic	5,900	1,700	300	500	1,200	400	700	100
Psychologists	138,400	9,900	1,500	5,100	32,100	25,900	7,600	2,000
White	131,700	9,600	1,500	4,800	30,700	25,100	5,900	2,000
Black	3,100	100	--	200	1,200	600	300	--
Asian	800	--	--	100	200	200	--	--
Native American	1,400	--	--	--	--	--	600	--
Hispanic	2,700	--	--	--	600	200	800	--

See explanatory information and SOURCE at end of table.

Table 13. Employed male scientists and engineers, by field, racial/ethnic group, and selected primary work activity: 1986

Field and racial/ethnic group	Total employed (1)	Research	Development	Management of R&D	General management	Teaching	Production/ inspection	Reporting, statistical work and computing
Social scientists	293,800	23,000	6,700	17,100	90,200	56,800	16,700	23,500
White	265,000	21,200	5,900	15,400	81,800	50,300	15,100	21,900
Black	13,500	300	300	300	5,100	2,800	600	900
Asian	9,200	900	100	300	2,800	3,500	500	400
Native American	1,300	100	--	--	100	100	600	--
Hispanic	7,400	100	400	1,700	2,100	900	200	800
Engineers, total	2,341,100	93,100	661,000	231,700	491,700	53,000	404,600	103,900
White	2,133,200	83,000	591,500	215,300	457,800	47,600	369,400	93,700
Black	36,900	1,000	10,800	3,400	6,600	600	8,600	1,800
Asian	125,500	6,900	45,200	10,600	18,700	4,100	18,400	5,700
Native American	13,100	200	3,500	800	2,700	--	2,500	400
Hispanic	44,000	2,100	11,000	3,200	8,600	1,100	9,700	2,700

Double dashes (--) represent too few cases to estimate.

(1) Includes "consulting," "other," and "no report" categories
(2) Detail will not add to total employed because
    (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
    (b) total employed includes "other" and "no report" categories.
(3) Includes members of all racial groups

NOTE: All figures have been rounded to the nearest 100. Detail may not sum to totals because of rounding.

SOURCE: National Science Foundation, Science Resources Studies Division, Scientific and Personnel Data System (STPDS). Tabulations are published in Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 14, pp. 93-96.

BEST COPY AVAILABLE

Table 14. Employed female scientists and engineers, by field, racial/ethnic group, and selected primary work activity: 1986

Page 1 of 2

Field and racial/ethnic group	Total employed (1)	Research	Development	Management of R&D	General management	Teaching	Production/ inspection	Reporting, statistical work and reporting
Total, all fields (2)	698,600	79,000	73,200	31,400	102,500	81,500	53,600	131,700
White	608,900	69,900	63,000	27,500	86,600	73,600	45,000	114,400
Black	34,500	2,600	2,000	2,000	6,400	2,800	3,400	7,100
Asian	36,300	4,800	5,200	1,700	6,300	2,600	3,700	8,200
Native American	2,700	200	100	(4)	900	200	100	300
Hispanic (3)	19,600	2,200	2,100	200	2,900	3,500	1,500	2,400
Scientists, total	599,600	70,200	41,000	27,000	93,600	77,500	34,600	122,400
White	524,800	61,800	35,200	24,100	79,100	70,400	28,700	107,300
Black	30,100	2,600	1,100	1,900	5,800	2,800	2,300	5,800
Asian	29,000	4,200	3,000	1,000	5,800	2,100	2,600	7,500
Native American	2,400	200	--	--	900	200	100	100
Hispanic (3)	16,400	2,000	1,100	100	2,600	3,400	800	2,200
Physical scientists	38,300	9,700	5,100	2,100	3,100	6,800	8,000	1,200
White	31,700	8,200	3,800	1,900	2,900	6,400	5,700	1,100
Black	1,700	400	400	100	100	100	400	--
Asian	4,200	900	800	100	200	100	1,900	--
Native American	--	--	--	--	--	--	--	--
Hispanic (3)	900	200	200	100	--	200	100	--
Mathematical scientists	33,900	1,600	1,300	2,500	4,700	12,800	1,600	5,600
White	30,300	1,500	1,200	1,900	4,500	11,600	1,100	4,900
Black	2,300	100	100	500	100	700	400	400
Asian	800	100	--	100	--	200	--	300
Native American	100	--	--	--	100	--	--	--
Hispanic (3)	1,200	--	--	--	--	700	--	200
Computer specialists	162,500	3,800	25,400	5,600	10,600	6,800	4,500	90,600
White	143,000	3,500	21,900	5,100	9,300	6,000	4,000	79,400
Black	7,200	--	600	200	1,000	100	300	4,500
Asian	8,800	200	1,600	200	300	200	200	5,600
Native American	400	--	--	--	--	--	--	100
Hispanic (3)	2,900	--	800	--	100	400	--	1,300
Environmental scientists	12,900	4,400	800	500	1,400	900	1,800	1,100
White	12,400	4,200	700	500	1,400	900	1,700	1,100
Black	100	--	--	--	--	--	--	--
Asian	200	100	100	--	--	--	--	--
Native American	100	--	--	--	--	--	--	--
Hispanic (3)	200	100	--	--	--	--	100	--
Life scientists	102,800	32,300	5,100	4,000	13,000	14,700	9,300	4,500
White	89,100	27,600	4,600	3,800	10,900	13,500	8,200	3,800
Black	3,300	1,400	--	100	600	300	200	100
Asian	5,600	2,400	500	100	500	600	400	--
Native American	1,000	--	--	--	600	--	100	--
Hispanic (3)	4,100	1,400	--	--	500	400	500	100
Psychologists	115,200	7,600	1,700	4,300	24,400	13,200	3,400	3,300
White	102,500	6,700	1,500	4,000	19,700	12,100	3,100	2,900
Black	6,000	400	--	300	1,100	500	300	200
Asian	4,400	200	--	--	3,300	100	--	200
Native American	500	--	--	--	--	200	--	--
Hispanic (3)	3,100	300	--	--	600	400	100	200

See explanatory information and SOURCE at end of table.

Table 14. Employed female scientists and engineers, by field, racial/ethnic group, and selected primary work activity: 1986

Page 2 of 2

Field and racial/ethnic group	Total employed (1)	Research	Development	Management of R&D	General management	Teaching	Production/inspection	Reporting, statistical work and reporting
Social scientists	134,000	10,800	1,700	8,100	36,400	22,300	5,900	16,000
White	115,800	10,100	1,500	7,000	30,500	19,800	4,800	14,000
Black	9,400	200	100	700	3,000	1,000	600	500
Asian	5,000	400	--	500	1,400	800	100	1,400
Native American	400	200	--	--	200	--	--	--
Hispanic (3)	4,000	--	--	--	1,400	1,300	--	400
Engineers, total	99,000	8,900	32,200	4,300	8,900	3,900	19,000	9,400
White	84,100	8,100	27,900	3,400	7,500	3,200	16,300	7,100
Black	4,400	--	800	100	500	--	1,100	1,300
Asian	7,300	500	2,300	700	600	500	1,100	700
Native American	300	--	100	--	--	--	--	100
Hispanic (3)	3,200	200	1,100	--	400	100	800	200

Double dashes (--) represent too few cases to estimate.

(1) Includes "consulting," "other," and "no report" categories
(2) Detail will not sum to total employed because
(a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
(b) total employed includes "other" and "no report" categories.
(3) Includes members of all racial groups

NOTE: All figures have been rounded to the nearest 100. Detail may not sum to totals because of rounding.

SOURCE: National Science Foundation, Science Resources Studies Division, Scientific and Personnel Data System. (STPDS). Tabulations are published in Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 15, pp. 97-100.

Table 15. Doctoral scientists and engineers in four-year colleges and universities, by field, tenure status, and racial/ethnic group: 1989

Page 1 of 2

Field (1) and racial/ethnic group	Total, four-year colleges and universities (2,3,4)	Tenure track, tenured	Tenure track, not tenured	Non-tenure track
Total, scientists and engineers	220,942	121,824	33,498	20,815
White	197,879	111,692	29,037	18,237
Black	3,993	1,957	865	434
Asian	17,663	7,592	3,292	2,058
Native American	406	198	99	--
Hispanic (5)	4,341	1,794	894	424
Scientists, total	195,981	107,797	29,065	19,327
White	177,154	99,342	25,644	17,088
Black	3,785	1,893	759	414
Asian	13,766	6,003	2,445	1,739
Native American	389	198	87	--
Hispanic (5)	3,846	1,521	770	414
Physical scientists	28,899	15,642	2,715	2,572
White	25,641	14,391	2,221	2,072
Black	401	142	51	110
Asian	2,567	918	402	372
Native American	74	65	--	--
Hispanic (5)	603	246	63	76
Mathematical scientists	13,588	9,169	2,183	676
White	12,103	8,415	1,781	569
Black	175	98	40	--
Asian	1,277	639	346	100
Native American	--	--	--	--
Hispanic (5)	271	81	98	81
Computer specialists	6,349	2,734	1,633	593
White	5,504	2,445	1,191	565
Black	--	--	--	--
Asian	818	274	434	28
Native American	--	--	--	--
Hispanic (5)	181	138	24	--
Environmental scientists	7,825	4,228	1,084	728
White	7,339	3,994	1,011	678
Black	31	--	--	--
Asian	439	225	54	40
Native American	--	--	--	--
Hispanic (5)	218	87	--	26
Life scientists (6)	68,686	32,884	10,200	9,550
White	61,669	30,295	9,372	8,353
Black	1,035	468	209	111
Asian	5,654	2,035	560	1,067
Native American	89	37	25	--
Hispanic (5)	1,133	388	201	136
Psychologists	22,930	12,494	3,301	2,175
White	21,726	12,039	3,035	2,050
Black	609	230	163	58
Asian	442	192	103	35
Native American	49	--	--	--
Hispanic (5)	399	135	76	45

See explanatory information and SOURCE at end of table.

Table 15. Doctoral scientists and engineers in four-year colleges and universities, by field, tenure status, and racial/ethnic group: 1989

Page 2 of 2

Field (1) and racial/ethnic group	Total, four-year colleges and universities (2,3,4)	Tenure track, tenured	Tenure track, not tenured	Non-tenure track
Social scientists	47,704	30,646	7,949	3,033
White	43,172	27,763	7,033	2,801
Black	1,527	945	277	127
Asian	2,569	1,720	546	97
Native American	154	85	47	--
Hispanic (5)	1,041	446	294	45
Engineers, total	24,961	14,027	4,433	1,488
White	20,725	12,350	3,393	1,149
Black	208	64	106	20
Asian	3,897	1,589	847	319
Native American	--	--	--	--
Hispanic (5)	495	273	124	--

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in general field categories.
(2) Racial/ethnic categories will not sum to total because
  (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
  (b) total includes "other" and "no report" categories.
(3) Includes doctoral scientists and engineers who received their doctorates between 1946 and 1988 and were employed full-time or part-time or holding postdoctoral appointments in February 1989 in 4-year institutions of higher education. All holders of doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).
(4) Tenure status categories will not sum to total because total includes "tenure not applicable" and "no report" categories.
(5) Includes members of all racial groups
(6) Includes agricultural, biological, and medical scientists

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations, tables B-70 and B-70C

Table 16. Male doctoral scientists and engineers in four-year colleges and universities, by field, tenure status, and racial/ethnic group: 1989

Page 1 of 2

Field (1) and racial/ethnic group	Total, four-year colleges and universities (2,3,4)	Tenure track, tenured	Tenure track, not tenured	Non-tenure track
Total, scientists and engineers	181,078	107,409	24,950	13,922
White	162,253	98,505	21,395	12,094
Black	2,766	1,464	523	287
Asian	14,905	6,930	2,787	1,490
Native American	317	183	62	--
Hispanic (5)	3,412	1,576	634	327
Scientists, total	156,796	93,553	20,789	12,520
White	142,083	86,303	18,234	11,011
Black	2,565	1,401	423	267
Asian	11,122	5,363	1,971	1,191
Native American	300	183	50	--
Hispanic (5)	2,938	1,303	522	323
Physical scientists	26,398	14,792	2,318	2,140
White	23,535	13,648	1,864	1,721
Black	363	120	45	108
Asian	2,220	836	368	293
Native American	73	65	--	--
Hispanic (5)	513	227	43	65
Mathematical scientists	12,263	8,439	1,828	582
White	10,996	7,800	1,497	479
Black	147	77	37	--
Asian	1,089	545	280	96
Native American	--	--	--	--
Hispanic (5)	247	71	89	76
Computer specialists	5,660	2,529	1,453	558
White	4,876	2,254	1,040	532
Black	--	--	--	--
Asian	760	262	406	26
Native American	--	--	--	--
Hispanic (5)	172	134	22	--
Environmental scientists	7,071	4,009	877	564
White	6,633	3,791	807	525
Black	26	--	--	--
Asian	400	215	51	31
Native American	--	--	--	--
Hispanic (5)	202	82	--	22
Life scientists (6)	52,202	28,007	6,866	5,951
White	47,137	25,876	6,349	5,191
Black	605	288	94	56
Asian	4,228	1,786	386	694
Native American	47	31	--	--
Hispanic (5)	826	334	125	108
Psychologists	15,267	9,648	1,927	1,014
White	14,654	9,396	1,803	961
Black	287	127	64	28
Asian	217	98	60	--
Native American	30	--	--	--
Hispanic (5)	213	87	39	28

See explanatory information and SOURCE at end of table.

Table 16. Male doctoral scientists and engineers in four-year colleges and universities, by field, tenure status, and racial/ethnic group: 1989

Page 2 of 2

Field (1) and racial/ethnic group	Total, four-year colleges and universities (2,3,4)	Tenure track, tenured	Tenure track, not tenured	Non-tenure track
Social scientists	37,935	26,129	5,520	1,711
White	34,252	23,538	4,874	1,602
Black	1,132	786	164	67
Asian	2,208	1621	420	42
Native American	132	80	30	--
Hispanic (5)	765	368	192	--
Engineers, total	24,282	13,856	4,161	1,402
White	20,170	12,202	3,161	1083
Black	201	63	100	20
Asian	3,783	1,567	816	299
Native American	--	--	--	--
Hispanic (5)	474	273	112	--

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in general field categories.
(2) Racial/ethnic categories will not sum to total because
  (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the other racial groups) and
  (b) total includes "other" and "no report" categories.
(3) Includes doctoral scientists and engineers who received their doctorates between 1946 and 1988 and were employed full-time or part-time or holding postdoctoral appointments in February 1989 in 4-year institutions of higher education. All holders of doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).
(4) Tenure status categories will not sum to total because total includes "tenure not applicable" and "no report" categories.
(5) Includes members of all racial groups
(6) Includes agricultural, biological, and medical scientists

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations, tables B-70A and B-70E

BEST COPY AVAILABLE

Table 17. Female doctoral scientists and engineers in four-year colleges and universities, by field, tenure status, and racial/ethnic group: 1989

Page 1 of 2

Field (1) and racial/ethnic group	Total, four-year colleges & universities (2,3,4)	Tenure track, tenured	Tenure track, not tenured	Non-tenure track
Total, scientists and engineers (2)	39,864	14,415	8,548	6,893
White	35,626	13,187	7,642	6,143
Black	1,227	493	342	147
Asian	2,758	662	505	568
Native American	89	--	37	--
Hispanic (5)	929	218	260	97
Scientists, total	39,185	14,244	8,276	6,807
White	35,071	13,039	7,410	6,077
Black	1,220	492	336	147
Asian	2,644	640	474	548
Native American	89	15	37	--
Hispanic (5)	908	218	248	91
Physical scientists	2,501	850	397	432
White	2,106	743	357	351
Black	38	22	--	--
Asian	347	82	34	79
Native American	--	--	--	--
Hispanic (5)	90	--	20	--
Mathematical scientists	1,325	730	355	94
White	1,107	615	284	90
Black	28	21	--	--
Asian	188	94	66	--
Native American	--	--	--	--
Hispanic (5)	24	--	--	--
Computer specialists	689	205	180	35
White	628	191	151	33
Black	--	--	--	--
Asian	58	--	28	--
Native American	--	--	--	--
Hispanic (5)	--	--	--	--
Environmental scientists	754	219	207	164
White	706	203	204	153
Black	--	--	--	--
Asian	39	--	--	--
Native American	--	--	--	--
Hispanic (5)	--	--	--	--
Life scientists (6)	16,484	4,877	3,334	3,599
White	14,532	4,419	3,023	3,162
Black	430	180	115	55
Asian	1,426	249	174	373
Native American	42	--	--	--
Hispanic (5)	307	54	76	28
Psychologists	7,663	2,846	1,374	1,161
White	7,072	2,643	1,232	1,089
Black	322	103	99	30
Asian	225	94	43	26
Native American	--	--	--	--
Hispanic (5)	186	48	37	--

See explanatory information and SOURCE at end of table.

Table 17. Female doctoral scientists and engineers in four-year colleges and universities, by field, tenure status, and racial/ethnic group: 1989

Page 2 of 2

Field (1) and racial/ethnic group	Total, four-year colleges and universities (2,3,4)	Tenure track tenured	Tenure track, not tenured	Non-tenure track
Social scientists	9,769	4,517	2,429	1,322
White	8,920	4,225	2,159	1,199
Black	395	159	113	60
Asian	361	99	126	55
Native American	22	--	--	--
Hispanic (5)	276	78	102	26
Engineers, total	679	171	272	86
White	555	148	232	66
Black	--	--	--	--
Asian	114	22	31	20
Native American	--	--	--	--
Hispanic (5)	21	--	--	--

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in general field categories.
(2) Racial/ethnic categories will not sum to total because
  (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the other racial groups) and
  (b) total includes "other" and "no report" categories.
(3) Includes doctoral scientists and engineers who received their doctorates between 1946 and 1988 and were employed full-time or part-time or holding postdoctoral appointments in February 1989 in 4-year institutions of higher education. All holders of doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).
(4) Tenure status categories will not sum to total because total includes "tenure not applicable" and "no report" categories.
(5) Includes members of all racial groups
(6) Includes agricultural, biological, and medical scientists

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations, tables B-70B and B-70D

Table 18. Doctoral scientists and engineers in four-year colleges and universities, by field, racial/ethnic group, and academic rank: 1989

Page 1 of 2

Field (1) and racial/ethnic group	Total, four-year colleges and universities (2,3,4)	Academic rank Full professor	Associate professor	Assistant professor
Total, scientists and engineers	220,942	90,205	50,550	38,687
White	197,879	82,596	45,388	33,603
Black	3,993	1,071	1,318	1,031
Asian	17,663	6,238	3,423	3,705
Native American	406	129	112	95
Hispanic (5)	4,341	909	1,093	1,223
Scientists, total	195,981	78,877	45,372	34,701
White	177,154	72,597	41,256	30,575
Black	3,785	1,039	1,201	988
Asian	13,766	4,945	2,526	2,867
Native American	389	129	100	93
Hispanic (5)	3,846	826	887	1,065
Physical scientists	28,899	13,049	4,302	3,276
White	25,641	11,957	3,897	2,804
Black	401	120	38	132
Asian	2,567	856	292	296
Native American	74	35	30	--
Hispanic (5)	603	210	59	93
Mathematical scientists	13,588	6,822	3,267	2,513
White	12,103	6,271	2,799	2,085
Black	175	62	75	28
Asian	1,277	470	390	389
Native American	--	--	--	--
Hispanic (5)	271	63	24	169
Computer specialists	6,349	1,606	1,884	1,726
White	5,504	1,424	1,752	1,288
Black	--	--	--	--
Asian	818	179	122	428
Native American	--	--	--	--
Hispanic (5)	181	90	48	26
Environmental scientists	7,825	3,160	1,625	1,240
White	7,339	2,979	1,542	1,176
Black	31	--	--	--
Asian	439	171	73	46
Native American	--	--	--	--
Hispanic (5)	218	53	29	32
Life scientists	68,686	24,877	14,994	12,772
White	61,669	22,613	13,605	11,542
Black	1,035	283	341	202
Asian	5,654	1,914	999	930
Native American	89	27	--	30
Hispanic (5)	1,133	255	244	263

See explanatory information and SOURCE at end of table.

Table 18. Doctoral scientists and engineers in four-year colleges and universities, by field, racial/ethnic group, and academic rank: 1989

Page 2 of 2

Field (1) and racial/ethnic group	Academic rank			
	Total, four-year colleges and universities (2,3,4)	Full professor	Associate professor	Assistant professor
Psychologists	22,930	8,958	5,689	4,431
White	21,726	8,744	5,365	4,020
Black	609	51	205	234
Asian	442	133	55	154
Native American	49	30	--	--
Hispanic (5)	399	53	96	130
Social scientists	47,704	20,405	13,611	8,743
White	43,172	18,609	12,296	7,660
Black	1,527	511	537	377
Asian	2,569	1,222	595	624
Native American	154	35	50	47
Hispanic (5)	1,041	102	387	352
Engineers, total	24,961	11,328	5,178	3,986
White	20,725	9,999	4,132	3,028
Black	208	32	117	43
Asian	3,897	1,293	897	838
Native American	--	--	--	--
Hispanic (5)	495	83	206	158

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in general field categories.
(2) Includes doctoral scientists and engineers who were employed full-time or part-time or holding postdoctoral appointments at 4-year institutions of higher education in February 1989. All holders of doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).
(3) Academic rank categories will not sum to the total employed because the total includes "other faculty ranks" and "no report" categories.
(4) Racial/ethnic categories will not sum to the total employed category because
(a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the other racial groups) and
(b) total employed includes "other" and "no report" categories.
(5) Includes members of all racial groups

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations

BEST COPY AVAILABLE

Table 19. Male doctoral scientists and engineers in four-year colleges and universities, by field, racial/ethnic group, and academic rank: 1989

Page 1 of 2

Field (1) and racial/ethnic group	Academic rank			
	Total, four-year colleges and universities (2,3,4)	Full professor	Associate professor	Assistant professor
Total, scientists and engineers	181,078	82,857	40,873	27,371
White	162,253	75,887	36,684	23,541
Black	2,766	883	932	604
Asian	14,905	5,806	2,911	2,971
Native American	317	126	104	49
Hispanic (5)	3,412	824	892	894
Scientists, total	156,796	71,619	35,828	23,675
White	142,083	65,964	32,668	20,763
Black	2,565	851	818	565
Asian	11,122	4,527	2,028	2,166
Native American	300	126	92	47
Hispanic (5)	2,938	741	691	746
Physical scientists	26,398	12,497	3,881	2,774
White	23,535	11,453	3,546	2,362
Black	363	111	30	119
Asian	2,220	817	233	250
Native American	73	35	30	--
Hispanic (5)	513	201	48	65
Mathematical scientists	12,263	6,479	2,847	2,069
White	10,996	5,986	2,449	1,721
Black	147	47	70	24
Asian	1,089	427	325	315
Native American	--	--	--	--
Hispanic (5)	247	56	21	160
Computer specialists	5,660	1,521	1,719	1,493
White	4,876	1,349	1,595	1,086
Black	--	--	--	--
Asian	760	169	114	400
Native American	--	--	--	--
Hispanic (5)	172	90	44	24
Environmental scientists	7,071	3,060	1,486	981
White	6,633	2,883	1,414	925
Black	26	--	--	--
Asian	400	167	65	41
Native American	--	--	--	--
Hispanic (5)	202	51	29	27
Life scientists	52,202	22,287	11,361	8,193
White	47,137	20,330	10,391	7,436
Black	605	193	189	92
Asian	4,228	1,700	762	603
Native American	47	27	--	--
Hispanic (5)	826	212	206	156

See explanatory information and SOURCE at end of table.

Table 19. Male doctoral scientists and engineers in four-year colleges and universities, by field, racial/ethnic group, and academic rank: 1989

Page 2 of 2

Field (1) and racial/ethnic group	Academic rank			
	Total, four-year colleges and universities (2,3,4)	Full professor	Associate professor	Assistant professor
Psychologists	15,267	7,416	3,966	2,343
White	14,654	7,272	3,768	2,173
Black	287	32	120	83
Asian	217	82	--	82
Native American	30	30	--	--
Hispanic (5)	213	45	52	78
Social scientists	37,935	18,359	10,568	5,822
White	34,252	16,691	9,505	5,060
Black	1,132	456	406	237
Asian	2,208	1,165	513	475
Native American	132	32	48	30
Hispanic (5)	765	86	291	236
Engineers, total	24,282	11,238	5,045	3,696
White	20,170	9,923	4,016	2,778
Black	201	32	114	39
Asian	3,783	1,279	883	805
Native American	--	--	--	--
Hispanic (5)	474	83	201	148

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in general field categories.
(2) Includes doctoral scientists and engineers who were employed full-time or part-time or holding post-doctoral appointments at 4-year institutions of higher education in February 1989. All holders of doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).
(3) Academic rank categories will not sum to the total employed because the total includes "other faculty ranks" and "no report" categories.
(4) Racial/ethnic categories will not sum to the total employed category because
  (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
  (b) total employed includes "other" and "no report" categories.
(5) Includes members of all racial groups

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations

Table 20. Female doctoral scientists and engineers in four-year colleges and universities, by field, racial/ethnic group, and academic rank: 1989

Page 1 of 2

Field (1) and racial/ethnic group	Academic rank			
	Total, four-year colleges and universities (2,3,4)	Full professor	Associate professor	Assistant professor
Total, scientists and engineers	39,864	7,348	9,677	11,316
White	35,626	6,709	8,704	10,062
Black	1,227	188	386	427
Asian	2,758	432	512	734
Native American	89	--	--	46
Hispanic (5)	929	85	201	329
Scientists, total	39,185	7,258	9,544	11,026
White	35,071	6,633	8,588	9,812
Black	1,220	188	383	423
Asian	2,644	418	498	701
Native American	89	--	--	46
Hispanic (5)	908	85	196	319
Physical scientists	2,501	552	421	502
White	2,106	504	351	442
Black	38	--	--	--
Asian	347	39	59	46
Native American	--	--	--	--
Hispanic (5)	90	--	--	28
Mathematical scientists	1,325	343	420	444
White	1,107	285	350	364
Black	28	--	--	--
Asian	188	43	65	74
Native American	--	--	--	--
Hispanic (5)	24	--	--	--
Computer specialists	689	85	165	233
White	628	75	157	202
Black	--	--	--	--
Asian	58	--	--	28
Native American	--	--	--	--
Hispanic (5)	--	--	--	--
Environmental scientists	754	100	139	259
White	706	96	128	251
Black	--	--	--	--
Asian	39	--	--	--
Native American	--	--	--	--
Hispanic (5)	--	--	--	--
Life scientists	16,484	2,590	3,633	4,579
White	14,532	2,283	3,214	4,106
Black	430	90	152	110
Asian	1,426	214	237	327
Native American	42	--	--	22
Hispanic (5)	307	43	38	107
Psychologists	7,663	1,542	1,723	2,088
White	7,072	1,472	1,597	1,847
Black	322	--	85	151
Asian	225	51	39	72
Native American	--	--	--	--
Hispanic (5)	186	--	44	52

See explanatory information and SOURCE at end of table.

Table 20. Female doctoral scientists and engineers in four-year colleges and universities, by field, racial/ethnic group, and academic rank: 1989

Page 2 of 2

Field (1) and racial/ethnic group	Academic rank			
	Total, four-year colleges and universities (2,3,4)	Full professor	Associate professor	Assistant professor
Social scientists	9,769	2,046	3,043	2,921
White	8,920	1,918	2,791	2,600
Black	395	55	131	140
Asian	361	57	82	149
Native American	22	--	--	--
Hispanic (5)	276	--	96	116
Engineers, total	679	90	133	290
White	555	76	116	250
Black	--	--	--	--
Asian	114	--	--	33
Native American	--	--	--	--
Hispanic (5)	21	--	--	--

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in general field categories.
(2) Includes doctoral scientists and engineers who were employed full-time or part-time or holding postdoctoral appointments at 4-year institutions of higher education in February 1989. All holders of doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).
(3) Academic rank categories will not sum to the total employed because the total includes "other faculty ranks" and "no report" categories.
(4) Racial/ethnic categories will not sum to the total employed category because
    (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
    (b) total employed includes "other" and "no report" categories.
(5) Includes members of all racial groups

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations

Table 21. Selected employment characteristics of scientists and engineers, by field, sex, and racial/ethnic group: 1986

Page 1 of 2

Field (1) and racial/ethnic group	Labor force participation rate (2)			Unemployment rate (3)			S&E underemployment rate (4)		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total, all fields (5)	94.5	94.6	93.9	1.5	1.3	2.7	2.6	1.9	6.3
White	94.3	94.4	93.8	1.5	1.3	2.6	2.5	1.9	6.1
Black	97.2	97.6	96.4	3.8	2.8	6.0	5.5	3.7	9.7
Asian	96.3	97.0	93.1	1.8	1.9	1.6	2.2	1.8	4.1
Native American	96.0	95.9	96.8	1.2	1.3	--	2.4	1.1	13.1
Hispanic (6)	95.2	96.1	92.2	2.1	2.2	1.7	4.8	2.5	13.4
Scientists, total	95.3	95.9	94.0	1.9	1.6	2.7	4.3	3.3	7.0
White	95.2	95.8	93.8	1.8	1.5	2.6	4.2	3.3	6.7
Black	97.0	97.2	96.7	3.7	1.6	6.5	7.5	5.2	10.8
Asian	96.1	97.5	93.2	2.3	2.8	1.1	3.5	3.0	4.6
Native American	96.6	96.7	96.4	2.1	2.7	--	5.0	2.1	14.7
Hispanic (6)	94.9	96.5	91.9	3.0	3.8	1.4	8.2	4.0	15.9
Physical scientists	93.6	94.1	90.8	1.4	1.2	3.1	1.9	1.6	3.5
White	93.5	94.0	90.2	1.4	1.1	3.1	1.7	1.5	3.0
Black	98.1	98.4	97.6	2.6	2.0	4.2	4.6	3.1	8.5
Asian	93.0	93.5	91.9	1.2	1.3	0.9	2.5	2.2	3.3
Native American	80.7	80.7	--	--	--	--	--	--	--
Hispanic (6)	94.1	97.3	83.1	3.2	1.3	10.7	1.8	1.7	2.6
Mathematical scientists	94.6	95.4	92.6	1.3	0.8	2.7	3.3	2.0	7.1
White	94.2	95.0	92.1	1.3	0.7	2.7	3.1	1.8	6.8
Black	98.4	98.4	98.5	1.2	--	3.4	4.2	5.5	1.8
Asian	97.9	98.4	94.8	2.3	2.6	--	3.9	3.3	7.5
Native American	100.0	100.0	100.0	--	--	--	44.0	--	86.2
Hispanic (6)	97.6	97.7	97.4	0.9	1.4	--	3.6	1.5	6.9
Computer specialists	98.5	99.4	96.5	0.8	0.6	1.6	2.5	2.5	2.5
White	98.6	99.4	96.6	0.8	0.5	1.6	2.4	2.4	2.2
Black	99.2	100.0	98.0	1.2	0.3	2.7	4.2	2.7	6.6
Asian	97.6	99.3	92.7	0.6	0.5	1.0	2.7	2.5	3.4
Native American	100.0	100.0	100.0	1.9	2.2	--	--	--	--
Hispanic (6)	96.4	100.0	89.3	0.9	1.3	--	5.5	6.6	3.1
Environmental scientist	94.5	94.8	92.1	4.4	3.9	8.2	5.6	4.8	11.6
White	94.4	94.7	91.9	4.5	4.0	8.4	5.5	4.6	11.7
Black	97.5	97.1	100.0	0.6	0.2	2.8	4.4	5.1	--
Asian	97.3	97.1	100.0	2.6	2.9	--	8.8	9.7	--
Native American	93.8	93.0	100.0	--	--	--	15.5	10.2	50.0
Hispanic (6)	95.0	94.5	100.0	4.8	5.3	--	9.0	8.9	9.6
Life scientists	93.0	94.1	90.0	2.1	1.7	3.4	4.7	3.1	9.6
White	92.8	93.9	89.5	2.1	1.6	3.4	4.4	3.1	8.5
Black	98.5	98.8	97.9	3.8	1.4	7.4	7.3	3.4	13.7
Asian	94.0	96.1	90.7	2.6	2.1	3.3	7.5	3.2	14.7
Native American	100.0	100.0	100.0	--	--	--	0.7	--	2.0
Hispanic (6)	92.2	94.2	89.5	0.8	1.3	--	16.2	5.7	31.5
Psychologists	95.1	94.9	95.3	2.5	2.2	3.0	5.7	4.7	6.8
White	95.0	94.7	95.4	2.3	1.8	3.0	5.8	4.8	7.0
Black	94.5	97.0	93.3	3.6	1.5	4.6	4.9	--	7.5
Asian	99.0	100.0	98.8	4.3	23.0	--	--	--	--
Native American	100.0	100.0	100.0	8.5	11.2	--	11.5	--	44.6
Hispanic (6)	96.1	96.3	95.9	4.3	4.8	3.8	7.1	5.3	8.7

See explanatory information and SOURCE at end of table.

Table 21. Selected employment characteristics of scientists and engineers, by field, sex, and racial/ethnic group: 1986

Page 2 of 2

Field (1) and racial/ethnic group	Labor force participation rate (2)			Unemployment rate (3)			S&E underemployment rate (4)		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Social scientists	95.4	95.8	94.6	2.4	2.3	2.7	7.2	5.4	11.1
White	95.3	95.8	94.3	2.0	2.0	2.1	6.9	5.2	10.9
Black	95.0	93.7	96.8	6.8	3.4	11.2	13.1	9.8	17.9
Asian	96.1	97.8	92.9	6.4	9.6	--	3.0	4.3	0.5
Native American	95.0	100.0	81.1	--	--	--	7.5	9.7	--
Hispanic (6)	95.0	95.6	93.8	5.8	8.7	--	7.7	0.6	20.9
Engineers, total	93.8	93.8	93.6	1.2	1.2	2.5	1.0	1.0	2.3
White	93.5	93.5	93.5	1.2	1.1	2.5	1.0	0.9	2.4
Black	97.7	98.0	94.8	4.0	4.2	2.0	2.0	1.9	2.3
Asian	96.5	96.7	93.0	1.5	1.4	3.7	1.2	1.1	1.9
Native American	95.6	95.5	100.0	0.4	0.4	--	0.4	0.5	--
Hispanic (6)	95.6	95.8	93.4	1.2	1.0	3.2	1.4	1.5	0.8

Double dashes (--) represent too few cases to estimate.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in general categories.
(2) The labor force is defined as those who are employed and those who are seeking employment. The labor force participation rate is the number of those employed and those unemployed expressed as a percentage of the population.
(3) The unemployment rate is the number of those who are unemployed but seeking employment expressed as a percentage of the total labor force.
(4) The S&E underemployment rate is the number of scientists and engineers who are working part-time but seeking full-time jobs, or who are working in non-S&E jobs when S&E jobs would be preferred, expressed as a percentage of total employment.
(5) Detail will not average to total because
  (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
  (b) total employed includes "other" and "no report" categories.
(6) Includes members of all racial groups

SOURCE: National Science Foundation, Science Resources Studies Division, Scientific and Technical Personnel Data System (STPDS). Tabulations are published in Women and Minorities in Science and Engineering, NSF 90-301, January 1990, Appendix B, table 22, pp. 113-114.

Table 22. Labor force participation, unemployment, and underemployment rates of doctoral scientists and engineers, by field, sex, and racial/ethnic group: 1989

Page 1 of 2

Field (1) and racial/ethnic group	Labor force participation rate (2)			Unemployment rate (3)			Underemployment rate (4)		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total, scientists and engineers (5)	93.3	93.3	92.9	0.8	0.6	1.7	1.3	1.0	2.6
White	92.8	92.8	92.7	0.8	0.6	1.7	1.3	1.0	2.7
Black	97.6	98.4	95.9	3.7	4.2	2.5	2.9	2.9	2.9
Asian	97.4	97.8	94.7	0.7	0.5	1.8	0.9	0.7	2.3
Native American	95.0	95.6	93.3	1.5	--	6.2	1.6	1.7	1.1
Hispanic (6)	96.0	95.9	96.5	0.8	0.7	1.1	1.4	1.1	2.7
Scientists, total (5)	92.7	92.7	92.8	0.9	0.6	1.8	1.4	1.1	2.7
White	92.4	92.3	92.5	0.9	0.7	1.7	1.4	1.1	2.7
Black	97.3	98.1	95.8	1.4	0.7	2.6	2.7	2.6	3.0
Asian	96.6	97.1	94.5	0.8	0.6	1.9	1.3	1.0	2.3
Native American	94.6	95.1	93.3	1.7	--	6.6	1.7	1.9	1.2
Hispanic (6)	96.0	95.9	96.4	0.7	0.6	1.2	1.5	1.1	2.8
Physical scientists (5)	90.4	90.6	89.1	0.8	0.7	2.7	0.7	0.7	1.0
White	89.7	89.9	88.0	0.7	0.6	2.1	0.8	0.7	1.1
Black	99.4	99.6	98.1	1.2	0.3	7.6	0.4	0.4	--
Asian	95.8	96.2	93.5	1.9	1.5	4.7	0.2	--	1.1
Native American	100.0	100.0	100.0	--	--	--	--	--	--
Hispanic (6)	91.2	91.6	89.2	0.8	0.6	1.5	--	--	--
Mathematical scientists (5)	94.2	94.2	91.9	0.5	0.4	1.2	0.7	0.7	1.0
White	93.7	94.1	91.0	0.6	0.5	1.3	0.8	0.7	1.2
Black	100.0	100.0	100.0	--	--	--	--	--	--
Asian	98.6	99.1	96.2	0.1	--	0.8	--	--	--
Native American	38.9	31.3	100.0	--	--	--	--	--	--
Hispanic (6)	98.2	100.0	84.6	0.9	--	9.1	1.9	2.1	--
Computer specialists (5)	99.4	99.4	99.4	--	--	0.2	1.0	0.8	2.6
White	99.3	99.3	99.4	--	--	0.2	1.0	0.8	2.5
Black	100.0	100.0	100.0	--	--	--	--	--	--
Asian	100.0	100.0	100.0	--	--	--	0.8	0.5	3.6
Native American	100.0	100.0	100.0	--	--	--	--	--	--
Hispanic (6)	100.0	100.0	100.0	--	--	--	--	--	--
Environmental scientists (5)	94.2	94.1	95.1	0.7	0.6	1.3	1.7	1.4	4.4
White	94.0	93.9	94.9	0.7	0.7	1.2	1.7	1.4	4.7
Black	100.0	100.0	100.0	0.9	0.9	--	--	--	--
Asian	96.9	96.8	97.8	0.2	--	--	1.6	1.8	--
Native American	100.0	100.0	100.0	--	--	--	--	--	--
Hispanic (6)	100.0	100.0	100.0	--	--	--	--	--	--
Life scientists (5)	91.9	91.9	91.9	0.8	0.6	1.5	1.0	0.8	1.9
White	91.5	91.5	91.6	0.9	0.7	1.5	1.0	0.7	1.9
Black	95.1	94.8	95.5	0.7	--	1.8	1.5	0.4	3.1
Asian	96.9	97.7	94.2	0.2	0.1	0.8	1.1	1.0	1.3
Native American	87.4	87.5	87.3	--	--	--	1.1	--	2.9
Hispanic (6)	96.6	96.2	98.0	1.0	1.1	0.5	2.1	2.3	1.6
Psychologists (5)	94.5	94.8	94.0	1.0	0.9	1.3	1.9	1.6	2.5
White	94.4	94.7	93.9	1.0	0.8	1.3	1.9	1.5	2.4
Black	97.4	100.0	95.5	1.1	1.2	1.0	3.0	4.2	2.1
Asian	94.9	95.1	94.7	2.2	3.0	1.3	2.7	--	5.7
Native American	100.0	100.0	100.0	2.8	--	--	--	--	--
Hispanic (6)	95.2	93.4	98.0	0.2	--	0.4	1.2	--	2.8

See explanatory information and SOURCE at end of table.

Table 22. Labor force participation, unemployment, and underemployment rates of doctoral scientists and engineers, by field, sex, and racial/ethnic group: 1989

Page 2 of 2

Field (1) and racial/ethnic group	Labor force participation rate (2)			Unemployment rate (3)			Underemployment rate (4)		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Social scientists (5)	92.4	92.2	93.1	1.3	0.8	3.0	2.8	2.1	5.2
White	92.1	91.9	92.8	1.2	0.8	2.9	2.6	1.9	5.2
Black	97.5	98.3	95.7	2.4	1.4	4.6	5.2	5.5	4.7
Asian	94.9	95.0	94.2	1.0	0.7	2.7	4.3	3.9	6.5
Native American	98.3	100.0	92.9	4.5	--	--	4.7	5.8	--
Hispanic (6)	97.5	97.7	96.9	1.0	0.5	2.4	1.5	--	6.2
Engineers, total (5)	96.0	95.9	97.9	0.7	0.6	0.8	0.6	0.5	1.0
White	95.2	95.1	98.3	0.4	0.4	0.9	0.6	0.6	0.7
Black	100.0	100.0	100.0	--	--	--	4.9	5.1	--
Asian	98.9	99.0	96.6	0.4	0.4	0.6	0.2	0.1	2.5
Native American	98.8	100.0	92.9	--	--	--	--	--	--
Hispanic (6)	96.3	96.2	100.0	1.1	1.1	--	0.9	1.0	--

Double dashes (--) represent too few cases to estimate.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in general field categories.
(2) The labor force is defined as those who are employed and those who are seeking employment. The labor force participation rate is the number of those employed and those unemployed expressed as a percentage of the population.
(3) The unemployment rate is the number of those who are unemployed but seeking employment expressed as a percentage of the total labor force.
(4) The S&E underemployment rate is the number of scientists and engineers who are working part-time but seeking full-time jobs, or who are working in non-S&E jobs when S&E jobs would be preferred, expressed as a percentage of total employment.
(5) Total figures include those who did not report a racial/ethnic group.
(6) Individuals who reported Hispanic ethnicity may also be included under one of the race categories.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates, unpublished tabulations

BEST COPY AVAILABLE

Table 23. Labor force participation and unemployment rates of recent science and engineering graduates, by degree level, field of degree, sex, and racial/ethnic group: 1990

Page 1 of 2

Field of degree (1) and rates (2,3)	Bachelor's recipients (4)							
	Total (5)	Male	Female	White	Black	Asian	Native American	Hispanic (6)
Total, science and engineering								
Labor force participation	97.4	98.2	96.1	97.5	96.5	96.0	100.0	97.1
Unemployment	3.4	3.5	3.3	3.0	6.4	5.6	1.5	4.4
Sciences, total								
Labor force participation	96.9	97.7	95.9	97.1	95.8	95.1	100.0	96.0
Unemployment	3.7	4.0	3.4	3.4	6.7	2.5	1.4	4.9
Physical sciences								
Labor force participation	97.0	97.3	96.5	97.3	96.6	92.6	100.0	91.8
Unemployment	5.0	6.0	2.8	3.6	4.1	5.8	--	3.1
Math/statistical sciences								
Labor force participation	96.7	98.7	94.8	97.4	93.0	94.7	100.0	83.0
Unemployment	4.1	3.1	5.2	4.1	2.7	2.7	--	4.1
Computer science								
Labor force participation	98.3	98.9	96.7	98.4	97.0	97.2	100.0	98.2
Unemployment	2.5	2.4	2.6	1.7	6.0	5.5	--	5.2
Environmental science								
Labor force participation	97.2	97.2	97.3	97.0	100.0	100.0	100.0	100.0
Unemployment	4.8	4.5	5.7	4.4	--	--	--	--
Life sciences								
Labor force participation	96.0	97.8	94.3	96.4	97.1	88.8	100.0	97.9
Unemployment	4.6	4.3	4.8	3.6	9.0	--	--	17.8
Psychology								
Labor force participation	96.1	97.4	95.5	96.3	90.5	100.0	100.0	100.0
Unemployment	2.9	6.9	1.0	3.5	--	--	--	--
Social sciences								
Labor force participation	97.1	96.9	97.4	97.1	97.5	94.9	100.0	95.5
Unemployment	4.0	3.8	4.2	9.8	9.8	--	4.5	4.5
Engineering, total								
Labor force participation	98.9	99.0	98.0	98.9	99.2	97.4	100.0	99.6
Unemployment	2.7	2.8	2.1	1.8	4.9	10.3	1.8	3.3

See explanatory information and SOURCE at end of table.

Table 23. Labor force participation and unemployment rates of recent science and engineering graduates, by degree level, field of degree, sex, and racial/ethnic group: 1990

Page 2 of 2

Field of degree (1) and rates (2,3)	Master's recipients (4)							
	Total (5)	Male	Female	White	Black	Asian	Native American	Hispanic (6)
Total science and engineering								
Labor force participation	97.1	98.5	93.9	97.1	98.2	95.9	100.0	98.4
Unemployment	1.8	1.5	2.7	1.6	4.6	3.3	--	4.3
Sciences, total								
Labor force participation	96.9	98.8	94.0	96.7	97.5	97.1	100.0	97.3
Unemployment	1.9	1.5	2.6	1.8	3.8	3.4	--	0.8
Physical sciences								
Labor force participation	97.9	98.5	96.5	98.0	100.0	95.1	--	89.2
Unemployment	2.1	2.1	2.1	1.6	3.6	2.7	--	6.0
Math/Statistics sciences								
Labor force participation	98.1	99.6	95.9	98.7	100.0	92.4	100.0	91.2
Unemployment	1.1	1.5	0.5	1.1	--	0.2	--	--
Computer science								
Labor force participation	98.2	99.3	95.3	98.3	94.8	99.5	100	94.8
Unemployment	1.5	0.8	3.2	0.8	13.8	2.6	--	--
Environmental science								
Labor force participation	99.8	99.7	99.9	100	100	93.8	100	100
Unemployment	2.7	2.7	2.6	3.0	--	--	--	--
Life sciences								
Labor force participation	96.5	98.0	95.0	96.2	100.0	95.5	100.0	100.0
Unemployment	2.1	2.1	2.1	2.1	4.9	1.4	--	2.3
Psychology								
Labor force participation	97.6	100.0	96.3	97.1	100.0	100.0	--	100.0
Unemployment	3.6	2.5	4.2	4.4	--	--	--	--
Social sciences								
Labor force participation	93.4	97.5	88.5	92.3	97.0	92.5	100.0	100.0
Unemployment	2.1	1.2	3.3	1.9	--	16.4	--	--
Total engineering								
Labor force participation	97.5	98.1	93.1	98.1	100	94.5	100.0	100.0
Unemployment	1.7	1.5	3.2	1.2	6.8	3	--	8.9

Double dashes (--) represent too few cases to estimate.

(1) For fields included in general field categories, see Characteristics of Science and Engineering Graduates: 1990, National Science Foundation, Science Resources Studies Division, (forthcoming 1992).

(2) The labor force is defined as those who are employed and those who are seeking employment. The labor force participation rate is the number of those employed and those unemployed expressed as a percentage of the population.

(3) The unemployment rate shows the ratio of those who are unemployed but seeking employment to the total labor force.

(4) Includes graduates, except full-time graduate students, who received their degrees in academic year 1988 or 1989

(5) Racial and ethnic categories will not average to total because
   (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and
   (b) total includes "other" and "no report" categories.

(6) Includes members of all racial groups

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Science, Survey of Social Science and Engineering, Graduates, (Recent Science and Engineering Graduates), unpublished tabulations

Table 24. Average annual salaries of scientists and engineers, by field, sex and racial/ethnic group: 1986

Page 1 of 1

Field and sex	Total Employed (1)	White	Black	Asian	Native American	Hispanic (2)
Total, all fields	$38,400	$38,700	$31,500	$39,100	$41,000	$34,600
Male	39,800	40,000	33,500	40,700	42,600	36,600
Female	29,900	30,200	26,200	30,100	29,800	25,200
Scientists, total	35,700	35,900	29,000	37,000	40,500	30,600
Male	38,000	38,100	31,400	40,500	44,100	33,900
Female	29,000	29,400	25,400	28,800	29,100	22,900
Physical scientists	40,700	40,900	35,600	39,300	63,400	41,300
Male	42,000	42,000	39,300	42,200	63,400	43,100
Female	31,300	31,800	24,300	31,400	--	33,900
Mathematical scientists	39,800	40,000	37,000	38,500	22,500	38,700
Male	42,500	42,800	38,400	39,300	19,900	42,100
Female	31,000	31,000	32,900	30,600	25,000	31,000
Computer specialists	37,300	37,500	32,200	37,400	39,300	31,500
Male	38,900	39,000	34,200	39,600	42,400	33,800
Female	33,200	33,700	29,300	30,800	20,500	25,800
Environmental scientists	37,500	37,600	31,800	40,600	27,000	40,500
Male	38,400	38,500	29,600	41,100	26,700	42,400
Female	30,100	30,100	36,100	35,100	28,000	21,200
Life scientists	33,100	33,200	29,300	35,700	40,600	29,700
Male	35,400	35,400	33,300	40,500	46,500	35,200
Female	25,200	25,100	21,600	28,400	32,500	18,700
Psychologists	33,400	33,900	26,800	22,500	41,200	25,400
Male	36,500	36,600	27,400	39,600	41,900	26,400
Female	29,000	29,700	26,600	19,300	37,400	24,000
Social scientists	31,800	32,200	22,800	38,700	34,300	25,600
Male	34,700	35,100	23,800	41,900	39,100	28,500
Female	25,000	25,200	21,400	31,700	21,500	18,700
Engineers, total	40,800	41,000	35,700	40,500	41,300	38,000
Male	41,100	41,200	35,900	40,800	41,500	38,300
Female	34,300	34,300	32,900	35,000	34,700	33,900

Double dashes (--) represent too few cases to estimate.

(1) Detail will not average to total because
  (a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups)
  (b) total employed includes "other" and "no" report categories.
(2) Includes members of all racial groups

NOTE: Salaries are for individuals employed full-time.

SOURCE: National Science Foundation, Science Resources Studies Division, Scientific and Technical Personnel Data System (STPDS). Tabulations are published in Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 25, p. 119

Table 25. Median annual salaries of doctoral scientists and engineers, by field, sex, and racial/ethnic group: 1989

Page 1 of 1

Field (1) and sex	Total (2,3)	White	Black	Asian	Native American	Hispanic (4)
Total, scientists and engineers	$54,600	$54,800	$48,500	$55,000	$50,100	$50,000
Male	56,000	56,300	51,200	55,700	51,500	50,900
Female	44,800	44,700	44,400	45,800	43,500	42,700
Scientists, total	52,200	52,400	47,200	51,700	48,700	48,300
Male	54,500	54,800	50,500	53,000	51,000	50,300
Female	44,400	44,400	44,300	45,100	40,900	42,400
Physical scientists	56,000	56,700	50,100	52,500	51,300	54,300
Male	57,100	57,800	50,300	53,300	51,300	55,900
Female	47,500	47,100	45,200	48,500	--	43,000
Mathematical scientists	51,600	51,900	44,500	47,900	--	44,000
Male	52,200	52,700	44,500	48,000	--	44,300
Female	45,200	44,800	--	47,000	--	--
Computer specialists	58,500	58,300	--	60,100	--	56,900
Male	60,100	60,100	--	60,400	--	56,900
Female	50,000	48,900	--	52,200	--	--
Environmental scientists	55,100	54,800	63,400	55,900	--	49,300
Male	55,600	55,400	63,400	56,900	--	49,300
Female	43,600	43,400	--	48,300	--	--
Life scientists	50,700	50,800	46,300	50,400	51,100	50,100
Male	53,200	53,300	47,100	52,600	--	50,600
Female	43,100	42,900	44,500	43,700	37,200	39,700
Psychologists	50,100	50,200	44,400	44,200	48,500	45,700
Male	51,300	51,500	46,900	48,600	--	49,700
Female	44,300	44,400	42,900	42,200	--	43,700
Social scientists	50,400	50,600	47,200	48,200	48,000	44,300
Male	52,000	52,500	47,900	50,200	--	44,800
Female	44,200	44,300	45,000	42,500	--	43,300
Engineers, total	62,500	64,300	55,700	58,400	--	55,400
Male	62,800	65,000	55,500	58,600	--	55,600
Female	53,400	53,200	--	54,000	--	50,100

Double dashes (--) represent too few cases to estimate; medians were not calculated for cells with fewer than 20 cases.

(1) See appendix A, "Technical Notes," page 69, for a list of fields included in the general field categories.
(2) Includes civilian scientists and engineers who received their doctorates between 1946 and 1988 and were employed full-time in February 1989. All holders of doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).
(3) Median salaries of racial/ethnic categories will not average to total because
    (a) racial and ethnic categories are not mutually exclusive (Hispanics' salaries may also be included in the salaries of one of the racial groups) and
    (b) the total median salary includes salaries for "other" and "no report" categories.
(4) Includes members of all racial groups

NOTE: All figures have been rounded to the nearest 100. Median salaries are for full-time employed civilians only.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations

BEST COPY AVAILABLE

Table 26. Median annual salaries of recent science and engineering graduates, by field of degree, sex, and racial/ethnic group: 1990

Page 1 of 1

Field of degree (1)	Total (2)	Male	Female	White	Black	Asian	Native American	Hispanic (4)
	Bachelor's recipients (3)							
Total, sciences and engineering	$26,000	$29,500	$21,600	$26,100	$24,000	$30,000	$21,900	$25,100
Sciences, total	23,000	25,100	20,100	23,000	22,200	27,900	--	21,100
Physical sciences	25,100	26,500	24,900	25,000	--	--	--	24,000
Mathematics and statistics	23,600	24,000	23,000	24,000	--	--	--	--
Computer science	30,100	30,600	30,000	30,100	28,000	33,200	--	30,000
Environmental science	23,700	24,000	22,900	23,600	--	--	--	--
Life sciences	21,000	23,000	19,600	21,000	20,100	--	--	--
Psychology	18,600	21,300	18,000	18,600	--	--	--	--
Social sciences	21,900	23,900	20,100	21,500	21,900	--	--	--
Engineers, total	33,000	33,000	33,800	33,300	32,500	32,800	--	32,200
	Master's recipients (3)							
Total, sciences and engineering	$37,000	$39,000	$32,800	$37,500	$35,000	$35,900	--	$36,100
Sciences, total	33,800	35,400	31,200	34,000	30,100	33,000	--	29,000
Physical sciences	34,900	36,000	31,100	35,900	--	32,100	--	--
Mathematics and statistics	32,800	35,000	30,000	32,800	--	--	--	--
Computer science	42,100	42,900	40,100	43,900	--	36,000	--	--
Environmental science	33,800	35,000	31,800	34,300	--	--	--	--
Life sciences	26,900	26,900	26,600	26,900	--	--	--	--
Psychology	32,000	36,900	32,000	32,100	--	--	--	--
Social sciences	31,000	30,000	31,200	31,100	--	--	--	--
Engineers, total	41,400	42,000	40,100	42,100	41,900	39,100	--	40,100

Double dashes (--) represent too few cases to estimate; medians were not calculated for cells with fewer than 20 cases.

(1) See SOURCE below for fields included in general field categories.
(2) Racial/ethnic categories will not average to total because
    (a) racial and ethnic categories are not mutually exclusive (Hispanics' salaries may also be included in the salaries of one of the racial groups) and
    (b) total median salaries include salaries for "other" and "no report" categories.
(3) Includes graduates who received their degrees in academic year 1988 or 1989
(4) Includes members of all racial groups

NOTE: All figures have been rounded to the nearest 100. Median salaries are for full-time employed civilians only.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Science, Social Science, and Engineering Graduates (Recent Science and Engineering Graduates), Characteristics of Science and Engineering Graduates: 1990, tables B41 and B44 (forthcoming 1992)

Table 27. Performance on the mathematics assessment, by age level, sex, and racial/ethnic group: 1973, 1978, 1982, 1986, and 1990

Page 1 of 1

A. Overall mean scores

Age level and test year	Total	Male	Female	White	Black	Hispanic
Age 9						
1973	219.1	217.7	220.3	224.9	190.0	202.1
1978	218.6	*217.4	*219.9	*224.1	*192.4	*202.9
1982	*219.0	*217.1	*220.8	*224.0	*194.9	*204.0
1986	*221.7	*221.7	*221.7	*226.9	201.6	205.4
1990	229.6	229.1	230.2	235.2	208.4	213.8
Age 13						
1973	266.0	265.1	266.9	273.7	227.7	238.8
1978	*264.1	*263.6	*264.7	*271.6	*229.6	238.0
1982	268.6	269.2	268.0	274.4	*240.4	252.4
1986	269.0	270.0	267.9	273.6	249.2	254.3
1990	270.4	271.2	269.6	276.3	249.1	254.6
Age 17						
1973	304.4	308.5	300.6	310.1	269.8	277.2
1978	*300.4	303.8	297.1	305.9	*268.4	276.3
1982	*298.5	*301.5	*295.6	*303.7	*271.8	276.7
1986	302.0	304.7	*299.4	307.5	*278.6	283.1
1990	304.6	306.3	302.9	309.5	288.5	283.5

B. Percentages of students who scored at or above proficiency levels on 1990 assessment

Age and proficiency levels	Total	Male	Female	White	Black	Hispanic
Age 9						
Level 150	99	99	99	100	97	98
Level 200	82	81	82	87	60	68
Level 250	28	28	28	33	9	11
Level 300	1	1	1	2	0	0
Level 350	0	0	0	0	0	0
Age 13						
Level 150	100	100	100	100	100	100
Level 200	99	98	99	99	95	97
Level 250	75	75	74	82	49	57
Level 300	17	19	16	21	4	6
Level 350	0	0	0	0	0	0
Age 17						
Level 150	100	100	100	100	100	100
Level 200	100	100	100	100	100	100
Level 250	96	96	96	98	92	86
Level 300	56	58	55	63	33	30
Level 350	7	9	6	8	2	2

*Statistically significant difference from 1990; significant test results unavailable for 1973

NOTE: Proficiency levels are defined as follows: (a) Level 150--simple arithmetic facts; (b) Level 200--beginning skills and understanding; (c) Level 250--basic operations and beginning problem-solving; (d) Level 300--moderately complex procedures and reasoning; and (e) Level 350--multi-step problem-solving and algebra.

SOURCE: U.S. Department of Education, National Center for Education Statistics (NCES), National Assessment of Educational Progress Program, Trends in Academic Progress Achievements of American Students in Science 1970-1990, Mathematics 1973-90, Reading 1971-90, and Writing 1984-90, pp. 283-300. This report is prepared by the Educational Testing Service (forthcoming 1992).

Table 28. Performance on the science assessment, by age level, sex, and racial/ethnic group: 1973, 1977, 1982, 1986, and 1990

Page 1 of 1

A. Overall mean scores

Age level and test year	Total	Male	Female	White	Black	Hispanic
Age 9						
1973	220.3	222.5	218.4	231.1	176.5	--
1977	*219.9	*222.1	*217.7	*229.6	*174.8	*191.9
1982	*220.8	*221.0	*220.7	*229.1	187.0	*189.0
1986	*224.3	*227.3	*221.3	*231.9	196.2	199.4
1990	228.7	230.3	227.1	237.5	196.4	206.2
Age 13						
1973	249.5	251.7	247.1	258.6	205.3	--
1977	*247.4	*251.1	*243.7	*256.1	208.1	213.4
1982	*250.1	255.6	245.0	*257.3	217.2	225.5
1986	251.4	256.1	246.9	259.2	221.6	226.1
1990	255.2	258.5	251.8	264.1	225.7	231.6
Age 17						
1973	295.8	304.3	288.3	303.9	250.4	--
1977	289.6	297.1	282.3	297.7	*240.3	262.3
1982	*283.3	291.9	*275.2	*293.1	*234.7	248.7
1986	288.5	294.9	282.3	297.5	252.8	259.3
1990	290.4	295.6	285.4	300.9	253.0	261.5

B. Percentages of students who scored at or above proficiency levels on 1990 assessment

Age level and test year	Total	Male	Female	White	Black	Hispanic
Age 9						
Level 150	97	97	97	99	88	94
Level 200	76	76	76	84	46	56
Level 250	31	33	29	38	9	12
Level 300	3	4	2	4	0	0
Level 350	0	0	0	0	0	0
Age 13						
Level 150	100	100	100	100	99	99
Level 200	92	93	92	97	78	80
Level 250	57	60	53	67	24	30
Level 300	11	14	9	14	2	3
Level 350	0	1	0	1	0	0
Age 17						
Level 150	100	100	100	100	99	100
Level 200	97	97	97	99	88	92
Level 250	81	83	80	90	51	60
Level 300	43	48	39	51	16	21
Level 350	9	13	6	11	2	2

*Statistically significant difference from 1990; significant test results unavailable for 1973

Double dashes (--) represent too few cases to estimate.

NOTE: Proficiency levels are defined as follows: (a) Level 150--knowledge of everyday science facts; (b) Level 200--understanding of simple scientific principles; (c) Level 250--application of basic scientific information; (d) Level 300--analysis of scientific procedures and data; and (e) Level 350--integration of specialized scientific information.

SOURCE: U.S. Department of Education, National Center for Education Statistics (NCES), National Assessment of Educational Progress Program, Trends in Academic Progress Achievements of American Students in Science 1970-90, Mathematics 1973-90, Reading 1971-90, and Writing 1984-90, pp. 241-258. This report is prepared by the Educational Testing Service (forthcoming 1992).

Table 29. Percentage of college-bound seniors who took natural science, social science, or mathematics in high school, by sex and racial/ethnic group: 1991

Page 1 of 1

Coursework	Total	Male	Female	White	Black	Asian	Native American	Mexican American	Puerto Rican	Latin American
Natural sciences										
Biology	97	97	97	97	96	95	97	96	96	96
Chemistry	81	82	80	82	74	87	72	73	76	77
Physics	44	51	37	44	32	64	33	34	42	43
Honors course	22	22	21	23	13	32	13	19	14	20
Average years taken	3.2	3.3	3.2	3.3	3.0	3.4	3.1	2.9	3.1	3.1
Social science										
Anthropology	2	2	2	2	2	3	2	1	2	3
Economics	52	51	53	51	51	56	49	75	39	57
Psychology	26	20	31	28	19	20	24	19	20	25
Sociology	15	12	17	16	12	10	15	10	13	13
Honors course	22	21	23	23	14	30	14	21	14	21
Average years taken	3.4	3.4	3.4	3.4	3.2	3.3	3.3	3.1	3.5	3.3
Mathematics										
Algebra	96	96	96	97	95	97	96	97	95	96
Geometry	93	93	92	94	86	94	89	93	89	91
Trigonometry	55	58	53	56	43	72	45	44	51	53
Precalculus	32	34	29	32	19	50	22	26	26	28
Calculus	19	22	17	19	9	38	11	13	10	16
Honors course	23	24	22	24	13	37	14	21	15	21
Average years taken	3.7	3.8	3.7	3.8	3.6	3.9	3.6	3.6	3.6	3.7

SOURCE: Admissions Testing Program of the College Entrance Examination Board, College-Bound Seniors, 1991 Profile of SAT and Achievement Test Takers (Princeton, NJ: Educational Testing Service, 1991), pp. 4-5, 10.

Table 30. Scholastic Aptitude Test (SAT) scores, by sex and racial/ethnic group: 1981-91

Page 1 of 1

Sex and racial/ethnic group	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
						Verbal					
Total	424	426	425	426	431	431	430	428	427	424	422
Male	430	431	430	433	437	437	435	435	434	429	426
Female	418	421	420	420	425	426	425	422	421	419	418
White	442	444	443	445	449	NA	447	445	446	442	441
Black	332	341	339	342	346	NA	351	353	351	352	351
Asian	397	398	395	398	404	NA	405	408	409	410	411
Native American	391	388	388	390	392	NA	393	393	384	388	393
Mexican American	373	377	375	376	382	NA	379	382	381	380	377
Puerto Rican	353	360	358	358	368	NA	360	355	360	359	361
Other Hispanic	NA	NA	NA	NA	NA	NA	387	387	389	383	382
						Mathematics					
Total	466	467	468	471	475	475	476	476	476	476	474
Male	492	493	493	495	499	501	500	498	500	499	497
Female	443	443	445	449	452	451	453	455	454	455	453
White	483	483	484	487	490	NA	489	490	491	491	489
Black	362	366	369	373	376	NA	377	384	386	385	385
Asian	513	513	514	519	518	NA	521	522	525	528	530
Native American	425	424	425	427	428	NA	432	435	428	437	437
Mexican American	415	416	417	420	426	NA	424	428	430	429	427
Puerto Rican	398	403	403	405	409	NA	400	402	406	405	406
Other Hispanic	NA	NA	NA	NA	NA	NA	432	433	436	434	431

NA = not available.

NOTE: Score range is 200 to 800 for each component.

SOURCE: Admissions Testing Program of the College Entrance Examination Board. Scores for 1981-88 are from College Bound Seniors, 1988 Profile of SAT and Achievement Test Takers (Princeton, NJ: Educational Testing Service, 1988); scores for 1989-91 are from Black Issues in Higher Education, vol. 8, no. 14, 1991, p. 18.

Table 31. Percentage distribution of scores and means on the Scholastic Aptitude Test, by sex and racial/ethnic group: 1991

Page 1 of 1

Score	Total	Male	Female	White	Black	Asian	Native American	Mexican American	Puerto Rican	Latin American
					Verbal					
700-800	1	1	1	1	--	2	--	--	--	--
650-699	2	2	2	2	--	3	1	1	1	1
600-649	4	4	4	5	1	5	2	1	1	2
500-599	18	19	18	21	7	17	12	10	9	12
400-499	32	32	32	36	21	25	33	27	24	26
300-399	30	28	30	28	40	26	36	39	32	35
Below 300	13	13	13	7	31	22	16	21	29	23
Mean	422	426	418	441	351	411	393	377	361	382
						Mathematics				
700-800	4	7	2	4	--	12	1	1	1	1
650-699	5	7	4	6	1	10	2	2	1	3
600-649	8	10	7	9	2	12	5	4	4	5
500-599	24	27	23	28	11	26	21	18	15	19
400-499	28	26	31	29	26	22	32	31	28	29
300-399	23	19	27	20	42	14	30	33	37	31
Below 300	6	5	7	4	18	4	9	10	15	10
Mean	474	497	453	489	385	530	437	427	406	431

Double dashes (--) indicate less than 1 percent.

NOTE: Figures have been rounded. Scores are for college-bound seniors.

SOURCE: Admissions Testing Program of the College Entrance Examination Board, College Bound Seniors, 1991 Profile of SAT and Achievement Test Takers (Princeton, NJ: Educational Testing Service, 1991), p. 9

Table 32. Achievement test scores in science and mathematics for college-bound seniors, by sex and racial/ethnic group: 1991

Page 1 of 1

Achievement and SAT-Math tests	Total	Male	Female	White	Black	Asian	Native American	Mexican American	Puerto Rican	Latin American
Chemistry	575	592	547	577	503	586	525	516	504	537
SAT-Math (1)	645	662	617	646	557	661	600	591	584	603
Biology	561	579	546	565	496	562	509	497	503	543
SAT-Math (1)	601	628	577	602	513	622	551	534	519	564
Physics	601	615	556	603	533	606	561	522	534	568
SAT-Math (1)	668	676	643	670	592	682	631	595	594	636
Mathematics Level I	549	570	531	554	486	573	509	481	505	509
SAT-Math (1)	569	595	546	578	494	584	530	483	519	517
Mathematics Level II	666	682	644	667	596	682	636	599	627	631
SAT-Math (1)	654	672	628	658	576	662	631	574	610	608

(1) Mean score on the math portion of the Scholastic Aptitude Test for seniors who took achievement test in subject.

NOTE: The score range is 200 to 800 for both the achievement test and the math portion of the SAT.

SOURCE: Admissions Testing Program of the College Entrance Examination Board, College Bound Seniors, 1991 Profiles of SAT and Achievement Test Takers (Princeton, NJ: Educational Testing Service, 1991), p. 11 Scores are from separate reports for each sex and racial/ethnic group.

Table 33. Average advanced placement test grades in science and math fields, by sex and racial/ethnic group: 1990

Page 1 of 1

Advanced placement test fields	Total	Male	Female	White	Black	Asian	Native American	Mexican American	Puerto Rican	Other Hispanic
Biology	2.96	3.13	2.80	2.97	2.07	3.17	2.50	2.20	2.41	2.47
Chemistry	2.94	3.09	2.65	2.93	1.96	3.20	2.20	2.10	2.49	2.34
Physics B	2.80	2.96	2.37	2.79	2.05	2.97	2.04	2.13	2.42	2.23
Physics C-Mechanics	3.36	3.47	2.90	3.38	2.44	3.49	2.13	2.45	2.82	2.79
Physics C-Electricity and Magnetism	3.32	3.38	3.01	3.33	2.75	3.34	1.50	2.65	2.42	2.97
Mathematics/Calculus AB	3.23	3.35	3.07	3.24	2.31	3.43	2.51	2.72	2.79	2.88
Mathematics/Calculus BC	3.65	3.74	3.48	3.65	3.08	3.72	3.52	3.18	3.20	3.43
Computer Science AB	2.81	2.90	2.35	2.88	2.04	2.74	2.23	2.25	2.05	2.06
Computer Science A	2.92	3.03	2.37	3.00	1.80	2.94	2.50	1.94	2.07	2.24

NOTE: The grading scale may be interpreted as follows:
1=no recommendation for college credit; 2=possibly qualified; 3=qualified; 4=well qualified; and 5=extremely well qualified. Average grades are for test takers at the 9th-, 10th-, 11th-, and 12th-grade and college levels.

SOURCE: Advanced Placement Program of the College Entrance Examination Board, 1990 Advanced Placement Program, National Summary Report (Princeton, NJ: Educational Testing Service, 1990), pp. 3-5.

Table 34. Intended undergraduate majors and corresponding Scholastic Aptitude Test (SAT) mathematics scores of college bound seniors by field, sex, and racial/ethnic group: 1991

Page 1 of 1

Area of study	Total	Male	Female	White	Black	Asian	Native American	Mexican American	Puerto Rican	Latin American
	Percentage of intended majors									
Science and engineering	32	40	29	34	35	37	32	35	35	36
Agriculture	1	2	1	2	--	--	2	1	1	1
Biological science	4	4	5	4	3	5	4	3	4	4
Computer science	3	4	2	2	7	4	3	3	4	4
Engineering	10	18	4	10	11	17	9	12	12	12
Mathematics	1	1	1	1	--	1	1	1	--	--
Physical science	1	2	1	2	1	2	1	1	1	1
Social science	12	9	15	13	13	8	12	14	13	14
Non-science and engineering	68	60	71	66	65	63	68	65	65	64
Business	19	20	18	18	22	21	18	19	21	21
Education	8	4	12	9	5	3	8	7	5	5
Other	41	36	41	39	38	39	42	39	39	38
	SAT mathematics scores									
Science and engineering										
Agriculture	445	441	451	449	374	487	398	406	393	431
Biological science	512	526	502	518	417	571	452	457	437	470
Computer science	467	503	406	508	368	530	424	408	382	407
Engineering	548	550	539	569	442	581	503	490	459	490
Mathematics	605	623	585	616	489	630	575	530	547	550
Physical science	572	587	541	577	457	620	527	496	482	511
Social science	477	511	460	493	387	530	442	425	407	433
Non-science and engineering										
Business	463	483	442	478	379	503	434	420	399	421
Education	441	454	437	450	360	468	416	398	372	398

Double dashes (--) represent less than 1 percent.

NOTE: SAT mathematics scores are the mean mathematics scores on the aptitude portion of the SAT. Scores range from 200 to 800.

SOURCE: Admissions Testing Program of the College Entrance Examination Board, College Bound Seniors, 1991 Profiles of SAT and Achievement Test Takers (Princeton, NJ: Educational Testing Service, 1991), p. 8.

Table 35. Selected characteristics of American freshmen, by sex and racial/ethnic group: 1980 and 1990 [Percentages]

Page 1 of 2

Characteristic	All freshmen, 1980 (1,2)								Freshmen planning a science or engineering major, 1980 (3)		
	Total	Male	Female	White	Black	Asian	Native American	Hispanic	Total	Male	Female
Average high school grade											
A-A+	9.9	8.0	11.6	13.4	4.2	23.1	10.7	10.6	18.8	17.1	21.4
A-	13.2	10.5	15.6	15.7	5.7	19.2	13.1	9.9	18.3	17.5	19.6
B+	20.4	17.7	22.8	21.9	16.1	22.7	18.4	21.2	21.3	20.9	22.0
B	26.8	25.8	27.7	25.6	25.8	19.9	26.9	27.8	22.0	22.1	21.7
B-	12.5	15.1	10.3	11.6	14.9	7.4	13.0	14.6	9.5	10.5	7.9
C or below	17.2	23.0	12.2	11.9	33.2	7.8	17.9	15.9	10.1	11.9	7.4
Estimated parental income											
Less than $10,000	14.2	12.7	16.0	7.4	40.5	16.6	18.1	37.3	9.9	8.3	12.4
$10,000-19,999	25.7	24.9	26.6	22.1	32.3	27.1	29.6	28.7	22.0	21.8	22.5
$20,000-29,999	26.7	28.2	25.3	28.9	14.9	22.8	24.7	18.9	27.4	28.8	25.0
$30,000-39,999	15.6	16.2	15.1	18.5	7.0	13.9	13.1	8.4	19.0	19.6	17.9
$40,000-49,999	7.4	7.6	7.1	9.3	2.9	6.7	7.2	2.7	9.2	9.3	9.1
$50,000-99,999	7.7	8.0	7.4	10.2	1.8	8.9	5.0	2.8	9.8	9.7	10.1
$100,000 or more	2.6	2.6	2.6	3.4	0.4	4.2	2.4	1.2	2.7	2.6	2.9
Parents' education											
Father											
Less than high school	16.5	16.0	17.2	10.7	37.1	17.8	22.1	45.5	12.3	11.8	13.0
High school graduate	27.3	27.7	26.9	24.9	30.6	15.4	24.8	20.0	22.0	22.2	21.6
Some college	13.6	13.6	13.6	14.4	11.5	11.1	14.4	8.2	13.7	13.8	13.4
College graduate	19.6	19.8	19.3	23.6	9.0	18.3	17.5	11.8	22.6	23.1	21.9
Some graduate school	2.7	2.6	2.7	3.4	1.3	3.2	3.1	0.9	3.5	3.5	3.7
Graduate degree	16.0	16.2	15.8	18.7	6.7	31.0	12.6	11.2	21.6	21.3	22.2
Postsecondary, not college	4.4	4.2	4.5	4.2	3.7	3.2	5.4	2.3	4.3	4.4	4.2
Mother											
Less than high school	12.5	12.3	12.8	7.5	27.3	24.5	15.9	43.7	9.4	9.1	10.0
High school graduate	39.3	40.5	38.3	38.2	35.0	24.9	34.2	27.0	34.4	35.7	32.5
Some college	15.4	15.2	15.6	17.3	13.6	10.6	18.3	10.8	16.9	16.7	17.1
College graduate	16.7	16.6	16.7	19.7	10.3	18.4	12.7	8.5	19.7	20.1	19.2
Some graduate school	2.5	2.5	2.5	2.8	1.9	3.1	3.1	1.6	3.3	3.1	3.6
Graduate degree	6.6	6.6	6.6	7.1	6.7	14.6	8.1	4.5	8.7	8.2	9.5
Postsecondary, not college	6.9	6.4	7.4	7.3	5.2	3.9	7.6	3.9	7.5	7.1	8.1
Highest degree planned											
Bachelor's	35.6	34.6	36.6	37.2	25.2	18.8	28.0	26.5	26.0	27.7	23.4
Master's	34.7	32.9	36.4	34.2	35.2	32.4	31.7	29.3	36.1	36.4	35.5
Doctorate	10.1	10.7	9.6	9.8	15.4	19.0	15.2	13.4	18.0	17.2	19.1
Medical	7.0	7.9	6.3	8.0	8.1	20.7	9.4	12.8	9.4	8.9	10.1
Law	5.2	6.0	4.6	5.4	6.6	3.7	7.3	8.9	7.4	6.5	8.7
Other (4)	7.2	8.0	6.6	5.5	9.3	5.4	8.3	9.0	3.2	3.2	3.2

See explanatory information and SOURCES at end of table.

Table 35. Selected characteristics of American freshmen, by sex and racial/ethnic group:
1980 and 1990 [Percentages]

Page 2 of 2

Characteristic	All freshmen, 1990 (1,2)								Freshmen planning a science or engineering major, 1990 (3)		
	Total	Male	Female	White	Black	Asian	Native American	Hispanic	Total	Male	Female
Average high school grade											
A-A+	10.7	8.9	12.2	14.3	4.5	25.6	13.4	12.1	19.8	19.3	20.3
A-	13.7	11.8	15.2	17.7	6.1	22.3	13.7	15.6	18.9	18.7	19.2
B+	19.3	17.0	21.3	21.2	16.4	20.3	18.8	22.5	20.7	20.9	21.5
B	25.1	24.4	25.7	24.0	23.6	18.5	23.8	23.2	21.1	21.0	21.4
B-	13.9	15.9	12.2	11.9	17.1	7.5	13.3	12.6	10.1	10.9	9.0
C or below	17.3	21.9	13.4	10.9	32.4	5.8	17.0	14.0	9.5	10.2	8.7
Estimated parental income											
Less than $10,000	5.8	5.1	6.6	2.7	16.5	7.8	9.3	13.2	4.7	4.0	5.6
$10,000-19,999	9.9	8.6	10.9	6.3	18.4	12.2	15.1	17.9	8.4	7.2	9.9
$20,000-29,999	13.4	12.9	13.9	10.8	18.3	12.7	15.7	18.0	11.9	11.7	12.2
$30,000-39,999	17.3	16.8	17.7	17.2	15.6	14.4	16.5	17.0	15.8	16.3	15.2
$40,000-49,999	12.7	13.2	12.2	13.4	8.9	9.5	10.8	10.1	12.4	12.9	11.8
$50,000-59,999	11.9	12.1	11.8	13.3	7.1	9.8	10.7	8.1	12.5	13.1	11.7
$60,000-74,999	11.9	12.4	11.4	13.5	7.7	10.4	11.0	7.2	13.0	13.4	12.4
$75,000-99,999	7.8	8.6	7.1	9.8	4.5	8.4	5.2	4.0	9.5	9.8	9.1
$100,000 or more	9.3	10.2	8.5	12.9	2.9	14.8	5.8	4.5	11.8	11.7	12.0
Parents' education											
Father											
Less than high school	10.1	9.0	11.0	6.6	17.3	11.7	15.3	33.5	8.1	7.4	8.9
High school graduate	26.4	25.7	27.0	23.2	34.6	13.8	28.1	21.9	20.6	20.1	21.4
Some college	16.1	15.8	16.3	15.1	17.3	10.9	16.7	15.5	14.9	14.4	15.6
College graduate	21.6	22.6	20.8	24.7	13.6	24.5	19.3	12.7	23.3	24.5	21.9
Some graduate school	2.6	2.7	2.6	3.4	1.6	3.0	2.0	1.2	3.6	3.6	3.5
Graduate degree	17.6	18.8	16.7	22.3	9.9	33.2	14.0	11.7	24.2	24.7	23.5
Postsecondary, not college	5.5	5.4	5.7	4.9	5.7	2.9	4.4	3.5	5.2	5.3	5.1
Mother											
Less than high school	7.7	6.9	8.5	4.8	13.0	17.1	11.1	30.7	6.4	5.8	7.2
High school graduate	32.2	32.1	32.2	31.3	29.9	20.3	29.6	28.2	27.2	27.5	26.8
Some college	18.4	17.8	18.9	18.2	21.3	10.3	23.5	16.0	18.2	17.3	19.2
College graduate	19.9	21.0	19.0	22.5	15.9	27.5	17.4	10.9	23.4	24.9	21.7
Some graduate school	3.1	3.2	3.0	3.8	2.3	3.2	2.6	2.1	3.9	3.8	4.0
Graduate degree	10.4	11.1	9.9	11.7	10.5	17.0	10.3	7.2	13.2	13.3	13.1
Postsecondary, not college	8.3	7.9	8.6	7.8	7.1	4.6	5.4	4.9	7.7	7.4	8.1
Highest degree planned											
Bachelor's	29.5	31.5	27.8	28.7	23.3	13.5	28.1	23.0	18.5	22.0	14.0
Master's	40.7	39.3	42.0	41.4	38.6	35.3	32.8	38.4	37.1	38.9	34.8
Doctorate	14.1	13.8	14.4	13.7	17.4	22.8	17.4	18.4	24.6	22.5	27.2
Medical	6.0	5.4	6.5	7.3	7.6	19.5	9.0	9.7	9.1	7.7	10.9
Law	5.0	4.9	5.1	5.8	7.1	5.7	7.0	7.0	8.6	7.0	10.7
Other (4)	4.7	5.1	4.2	3.1	5.9	3.2	5.7	3.5	2.1	1.9	2.2

(1) Includes freshmen at all 4-year colleges
(2) Racial and ethnic categories may total to more than 100 because students could select more than one category.
(3) Data by racial/ethnic group are not reliable for those students whose intended major is a science or engineering field because of very small sample sizes.
(4) "Other" includes "none," "associate" and "divinity" degrees, and other degrees not listed.

SOURCES: Cooperative Institutional Research Program, Graduate School of Education, University of California, Los Angeles, The American Freshmen Norm Survey. Racial/ethnic data and data for 1980 and 1990 freshmen planning a science or engineering major are from unpublished tabulations generated from the Freshmen Norm Survey data base. All other 1980 figures are from Alexander W. Astin, Margo R. King, and Gerald T. Richardson, The The American Freshman: National Norms for Fall 1980 (Los Angeles, CA: Cooperative Institutional Research Research Program, Graduate School of Education, University of California, Los Angeles, 1980). All other figures for 1990 are from the 1990 edition of the same publication.

Table 36. Career choices of American freshmen, by sex and racial/ethnic group: 1980 and 1990

Page 1 of 1

Career choice	All freshmen (1)								Freshmen planning a science or engineering major (2)		
	Total	Male	Female	White	Black	Asian	Native American	Hispanic	Total	Male	Female
	1980										
Business manager	10.2	12.2	8.4	10.0	12.0	6.5	6.1	5.5	1.8	2.1	1.5
Business owner	2.2	3.6	1.0	1.9	1.4	1.3	0.8	1.2	0.5	0.7	0.2
Clinical psychologist	1.3	0.6	1.9	1.2	1.9	0.6	1.4	1.4	3.7	1.2	7.6
College teacher	0.3	0.3	0.2	0.3	0.3	0.2	0.4	0.2	0.2	0.2	0.2
Computer programmer	4.9	6.0	4.0	4.5	7.9	6.6	5.8	3.1	9.0	8.2	10.3
Engineer	8.1	14.3	2.6	10.2	9.4	22.3	12.4	10.5	32.2	43.6	14.5
Foreign Service officer	0.6	0.4	0.8	0.7	0.3	0.7	0.7	0.8	1.5	1.0	2.2
Lawyer	5.2	6.1	4.5	5.3	7.3	3.8	7.6	12.2	7.8	6.9	9.1
Physician	4.3	4.9	3.7	4.7	6.0	16.3	6.6	8.4	6.1	6.0	6.1
Science researcher	1.7	2.3	1.3	2.1	0.9	2.3	2.7	1.8	6.2	6.5	5.8
Social worker	2.3	0.8	3.7	1.7	3.3	0.6	3.0	2.9	4.9	0.9	11.2
Statistician	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.2	0.2
Elementary or secondary school teacher	8.8	4.0	13.2	6.8	4.3	1.3	4.8	3.7	0.7	0.5	1.1
Undecided	11.3	10.1	12.4	12.0	6.7	10.3	8.9	11.7	8.3	6.5	11.2
Other	38.7	34.3	42.2	38.5	38.2	27.1	38.8	36.5	16.9	15.5	18.8
	1990										
Business manager	9.9	12.3	7.9	9.7	12.0	9.9	6.7	10.6	2.0	2.4	1.5
Business owner	2.8	4.4	1.5	2.9	3.2	2.7	1.6	1.8	0.6	0.9	0.3
Clinical psychologist	1.8	0.7	2.7	1.6	2.2	1.4	2.3	1.9	5.5	1.7	10.2
College teacher	0.5	0.6	0.5	0.5	0.3	0.4	0.6	0.5	0.5	0.6	0.5
Computer programmer	2.7	3.8	1.8	1.7	5.8	2.5	2.3	2.1	4.7	5.7	3.6
Engineer	7.1	12.5	2.6	8.0	8.8	14.1	6.8	10.0	27.6	39.9	12.1
Foreign Service officer	0.8	0.6	1.0	1.2	0.4	1.4	1.0	1.5	2.4	1.5	3.5
Lawyer	5.4	5.2	5.6	5.9	8.8	5.8	7.2	8.0	9.7	7.8	12.2
Physician	3.8	3.7	3.9	4.5	6.3	16.2	4.6	7.7	6.7	5.7	7.9
Science researcher	1.6	1.9	1.3	2.0	0.8	2.4	3.1	1.7	5.8	5.8	5.8
Social Worker	1.3	0.3	2.1	0.8	1.7	0.5	1.8	1.3	3.1	0.5	6.2
Statistician	0.1	0.1	0.1	0.1	0.0	0.1	0.3	0.0	0.2	0.2	0.2
Elementary or secondary school teacher	12.4	5.6	17.9	10.5	6.7	2.4	9.5	7.8	1.8	1.2	2.4
Undecided	12.1	11.4	12.7	13.2	6.9	11.9	11.0	11.6	9.0	7.3	11.1
Other	37.7	36.9	38.4	37.4	36.1	28.3	41.2	33.5	20.4	18.8	22.5

(1) Includes freshmen at all 4-year colleges.
(2) Data by racial/ethnic group are not presented because they are not reliable, owing to small sample sizes.

SOURCE: Figures for "All freshmen" total, male, and female categories are from Alexander W. Astin, Margo R. King, and Gerald T. Richardson, The American Freshman: National Norms for Fall 1980 (Los Angeles, CA: Cooperative Institutional Research Programs, Graduate School of Education, University of California, Los Angeles, 1980), pp. 22, 38, and 54. All other figures are from unpublished tabulations generated from the Freshmen Norm Survey data base.

Table 37. Graduate Record Examination scores by undergraduate major, sex, and racial/ethnic group: 1979 and 1987

Page 1 of 2

Undergraduate major and year	Total	Male	Female	White	Black	Asian	Native American	Mexican American	Puerto Rican	Latin American
						Verbal				
All majors										
1979	488	487	489	511	363	480	459	419	389	465
1987	487	487	487	516	386	476	471	440	389	469
Sciences										
Physical										
1979	519	514	534	541	391	495	482	509	418	509
1987	505	504	509	546	422	516	521	490	391	496
Mathematical										
1979	505	510	498	537	364	476	494	420	375	468
1987	483	488	474	537	371	441	500	472	414	468
Biological										
1979	492	485	500	521	358	494	447	407	398	473
1987	504	502	506	527	404	511	479	471	380	494
Behavioral										
1979	507	506	509	528	386	503	483	446	399	481
1987	507	513	504	528	401	504	487	458	401	482
Social										
1979	454	452	457	484	343	453	451	409	363	465
1987	458	461	456	488	358	460	447	421	361	446
Engineering										
1979	468	465	497	527	403	459	478	434	390	476
1987	466	461	492	532	436	451	487	460	401	477
					Quantitative					
All majors										
1979	514	555	478	525	358	566	457	422	418	468
1987	539	585	499	541	390	604	473	456	443	495
Sciences										
Physical										
1979	630	640	600	639	462	658	581	600	532	592
1987	639	648	615	645	499	672	602	584	517	615
Mathematical										
1979	665	682	636	682	486	660	671	595	550	626
1987	657	670	635	673	472	658	652	613	573	603
Biological										
1979	555	577	528	569	381	596	479	448	450	509
1987	570	585	558	581	428	612	521	517	456	542
Behavioral										
1979	500	522	479	514	366	528	457	427	387	460
1987	513	539	494	522	382	547	459	446	403	479
Social										
1979	474	501	446	496	337	494	443	413	378	429
1987	479	511	454	495	346	517	439	405	378	436
Engineering										
1979	654	661	603	675	521	675	570	595	583	624
1987	673	675	663	688	579	682	636	626	601	634

See explanatory information and SOURCES at end of table.

Table 37. Graduate Record Examination scores by undergraduate major, sex, and racial/ethnic group: 1979 and 1987

Page 2 of 2

Undergraduate major and year	Total	Male	Female	White	Black	Asian	Native American	Mexican American	Puerto Rican	Latin American
					Analytical					
All majors										
1979	503	508	499	529	352	510	457	412	385	460
1987	528	536	522	554	404	537	487	459	421	493
Sciences										
Physical										
1979	557	555	564	581	406	546	523	516	433	524
1987	572	568	580	608	468	583	574	529	437	542
Mathematical										
1979	567	568	565	602	401	549	553	467	412	530
1987	588	590	585	639	435	553	615	546	491	546
Biological										
1979	521	518	526	553	359	537	456	421	401	484
1987	557	551	563	582	432	564	510	504	426	528
Behavioral										
1979	511	509	513	535	371	510	468	435	382	473
1987	530	530	530	551	409	531	490	469	418	500
Social										
1979	471	473	469	506	333	464	455	404	362	448
1987	494	495	493	526	379	484	457	431	383	458
Engineering										
1979	526	525	534	587	437	533	505	487	439	520
1987	563	557	601	626	502	554	563	539	491	542

NOTE: Score range is 200 to 800 for each component.

SOURCES: Graduate Record Examination Board, A Summary of Data Collected From Graduate Record Examination Test-Takers During 1978-79 (Data Summary Report #4) and A Summary of Data Collected From Graduate Test-Takers During 1986-87 (Data Summary Report #12) (Princeton, NJ: Educational Testing Service)

Table 38. Total science and engineering bachelor's degree recipients, by field: 1979-89

Page 1 of 1

Field of degree	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total, science and engineering	288,625	291,983	294,867	302,118	307,229	314,666	321,739	323,950	318,942	308,760	307,580
Sciences, total	234,905	232,743	230,799	234,327	234,275	238,135	243,868	246,889	244,237	238,354	240,366
Physical sciences	17,281	17,506	17,481	17,311	16,199	15,834	16,271	15,786	15,466	14,263	14,148
Astronomy	120	122	129	113	96	95	119	149	130	126	164
Chemistry	11,643	11,446	11,540	11,316	11,039	10,912	10,701	10,317	9,830	9,158	8,822
Physics	3,338	3,397	3,441	3,475	3,800	3,921	4,111	4,189	4,324	4,103	4,347
Other	2,180	2,541	2,371	2,407	1,264	906	1,340	1,131	1,182	876	815
Mathematics	11,901	11,473	11,173	11,708	12,557	13,342	15,267	16,388	16,626	16,122	15,439
Computer sciences	8,769	11,213	15,233	20,431	24,682	32,435	39,121	42,195	39,927	34,896	30,963
Earth, atmosphere, and oceanographic sciences	6,082	6,155	6,694	7,061	7,298	7,925	7,576	6,076	4,689	3,554	3,181
Atmospheric science	326	367	359	412	396	478	414	355	345	348	330
Geoscience	5,467	5,536	6,110	6,429	6,774	7,285	7,001	5,555	4,189	3,061	2,707
Oceanography	289	252	225	220	128	162	161	166	155	145	144
Agricultural and biological sciences	75,085	71,617	68,086	65,041	63,237	59,613	57,812	56,465	56,215	54,280	52,612
Agricultural sciences	21,631	21,121	20,166	19,235	19,170	17,303	15,879	14,740	15,082	14,331	13,559
Biological sciences	53,454	50,496	47,920	45,806	44,067	42,310	41,933	41,725	41,133	39,949	39,053
Psychology	43,012	42,513	41,364	41,539	40,825	40,375	40,237	40,937	43,195	45,378	48,954
Social sciences	72,775	72,266	70,768	71,236	69,477	68,611	67,584	69,042	68,119	69,861	75,069
Economics	18,150	19,736	20,700	21,880	22,410	22,874	23,073	23,796	22,419	22,997	23,550
Political sciences	25,817	25,658	25,217	25,885	26,020	25,943	26,065	26,661	26,999	27,333	30,519
Sociology	20,546	19,181	17,592	16,333	14,347	13,347	12,165	12,397	12,359	13,085	14,393
Other	8,262	7,691	7,259	7,138	6,700	6,447	6,281	6,188	6,342	6,446	6,607
Engineering, total	53,720	59,240	64,068	67,791	72,954	76,531	77,871	77,061	74,705	70,406	67,214
Aeronautical and astronautical	1,386	1,424	1,809	2,120	2,127	2,534	2,854	2,902	2,989	3,092	2,944
Chemical	6,442	7,276	7,639	8,059	8,550	9,192	8,941	7,411	6,114	4,654	4,187
Civil	10,583	11,046	11,331	11,280	10,747	10,351	9,730	9,223	8,746	8,131	8,015
Electrical	12,440	13,902	15,040	16,553	19,205	21,541	23,668	26,112	26,791	25,942	24,318
Industrial	2,804	3,217	3,878	4,044	3,824	4,020	4,009	4,255	4,313	4,259	4,121
Mechanical	10,360	12,020	13,573	14,315	16,031	17,040	17,200	16,586	15,723	15,331	15,217
Materials and metallurgy	1,021	1,267	1,399	1,648	1,390	1,352	1,275	1,257	1,150	1,203	1,114
Other	8,684	9,088	9,399	9,772	11,080	10,501	10,194	9,315	8,879	7,794	7,298

NOTE: For a list of subfields included in field categories, see pp. 3-10 of the National Science Foundation reference below. Data are collected on all degrees conferred between July 1 and June 30 from the universe of institutions of higher education in the 50 States, the District of Columbia (DC), and the U.S. territories.

SOURCE: U.S. Department of Education, National Center for Education Statistics (NCES), Degrees and Other Formal Awards Conferred and Completion surveys. Tabulations are published in National Science Foundation, Science and Engineering Degrees: 1966-89, A Source Book, NSF 91-314, 1991, pp. 25, 37-54.

Table 39. Male science and engineering bachelor's degree recipients, by field: 1979-89

Page 1 of 1

Field of degree	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total, science and engineering	186,333	186,009	186,425	188,957	191,617	196,650	200,301	200,893	195,633	186,671	183,787
Sciences, total	137,532	132,783	129,474	129,503	128,382	130,952	133,746	135,035	132,401	127,105	126,817
Physical sciences	13,381	13,317	13,167	12,779	11,586	11,177	11,434	11,090	10,793	9,677	9,777
Astronomy	100	98	103	92	72	75	89	126	127	107	127
Chemistry	8,530	8,169	8,065	7,703	7,303	7,087	6,807	6,573	6,156	5,506	5,391
Physics	2,939	2,963	3,009	3,014	3,317	3,361	3,550	3,578	3,629	3,492	3,705
Other	1,812	2,087	1,990	1,970	894	654	988	813	901	572	554
Mathematics	6,943	6,625	6,392	6,650	7,059	7,428	8,231	8,772	8,900	8,662	8,333
Computer sciences	6,306	7,814	10,280	13,316	15,690	20,369	24,690	27,069	26,038	23,543	21,418
Earth, atmospheric, and oceanographic sciences	4,695	4,693	5,028	5,254	5,450	5,991	5,715	4,722	3,629	2,707	2,380
Atmospheric science	289	325	302	346	330	380	346	296	284	291	278
Geoscience	4,153	4,170	4,550	4,731	5,007	5,477	5,244	4,292	3,218	2,298	1,995
Oceanography	253	198	176	177	113	134	125	134	127	118	107
Agricultural and biological sciences	47,537	44,021	40,610	38,115	36,677	34,253	32,664	31,643	31,592	29,731	28,787
Agricultural sciences	15,540	14,616	13,712	12,974	12,715	11,600	10,742	9,941	10,377	9,820	9,335
Biological sciences	31,997	29,405	26,898	25,141	23,962	22,653	21,922	21,702	21,215	19,911	19,452
Psychology	16,649	15,590	14,447	13,756	13,228	12,949	12,815	12,691	13,399	13,584	14,291
Social sciences	42,021	40,723	39,550	39,633	38,692	38,785	38,197	39,048	38,050	39,201	41,831
Economics	13,383	14,024	14,650	15,037	15,163	15,359	15,400	15,842	14,801	15,460	15,895
Political sciences	17,197	16,446	15,946	16,026	15,792	15,778	15,765	16,081	16,080	16,369	18,033
Sociology	7,156	6,391	5,361	4,889	4,363	4,293	3,767	3,862	3,897	4,086	4,488
Other	4,285	3,862	3,593	3,681	3,374	3,355	3,265	3,263	3,272	3,286	3,415
Engineering, total	48,801	53,226	56,951	59,454	63,235	65,698	66,555	65,858	63,232	59,566	56,970
Aeronautical and astronautical	1,320	1,342	1,680	1,949	1,955	2,359	2,613	2,654	2,741	2,794	2,643
Chemical	5,387	5,989	6,274	6,447	6,761	7,115	6,848	5,805	4,574	3,522	3,017
Civil	9,534	9,959	10,100	9,962	9,263	8,928	8,388	7,994	7,550	6,960	6,841
Electrical	11,781	13,000	13,940	15,142	17,283	19,252	20,936	22,885	23,227	22,418	21,130
Industrial	2,376	2,672	3,111	3,092	2,824	2,949	2,842	2,974	2,929	3,014	2,860
Mechanical	9,740	11,127	12,422	13,049	14,546	15,228	15,399	14,876	13,996	13,567	13,537
Materials and metallurgy	839	1,044	1,134	1,330	1,104	1,031	990	922	853	887	853
Other	7,824	8,093	8,290	8,483	9,499	8,836	8,539	7,748	7,362	6,404	6,089

NOTE: For a list of subfields included in field categories, see pp. 3-10 of the National Science Foundation reference below. Data are collected on all degrees conferred between July 1 and June 30 from the universe of institutions of higher education in the 50 States, the District of Columbia (DC), and the U.S. territories.

SOURCE: U.S. Department of Education, National Center for Education Statistics (NCES), Degrees and Other Formal Awards Conferred and Completion surveys. Tabulations are published in National Science Foundation, Science and and Engineering Degrees: 1966-89, A Source Book, NSF 91-314, 1991, pp. 26, 37-54.

Table 40. Female science and engineering bachelor's degree recipients, by field: 1979-89

Page 1 of 1

Field of degree	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total, science and engineering	102,292	105,974	108,442	113,161	115,612	118,016	121,438	123,057	123,309	122,089	123,793
Sciences, total	97,373	99,960	101,325	104,824	105,893	107,183	110,122	111,854	111,836	111,249	113,549
Physical sciences	3,900	4,189	4,314	4,532	4,613	4,657	4,837	4,696	4,673	4,586	4,371
Astronomy	20	24	26	21	24	20	30	23	23	19	37
Chemistry	3,113	3,277	3,475	3,613	3,736	3,825	3,894	3,744	3,674	3,652	3,431
Physics	399	434	432	461	483	560	561	611	695	611	642
Other	368	454	381	437	370	252	352	318	281	304	261
Mathematics	4,958	4,848	4,781	5,058	5,498	5,914	7,036	7,616	7,726	7,460	7,106
Computer sciences	2,463	3,399	4,953	7,115	8,992	12,066	14,431	15,126	13,889	11,353	9,545
Earth, atmospheric, and oceanographic sciences	1,387	1,462	1,666	1,807	1,848	1,934	1,861	1,354	1,060	847	801
Atmospheric science	37	42	57	66	66	98	68	59	61	57	52
Geoscience	1,314	1,366	1,560	1,698	1,767	1,808	1,757	1,263	971	763	712
Oceanography	36	54	49	43	15	28	36	32	28	27	37
Agricultural and biological sciences	27,548	27,596	27,476	26,926	26,560	25,360	25,148	24,822	24,623	24,549	23,825
Agricultural sciences	6,091	6,505	6,454	6,261	6,455	5,703	5,137	4,799	4,705	4,511	4,224
Biological sciences	21,457	21,091	21,022	20,665	20,105	19,657	20,011	20,023	19,918	20,038	19,601
Psychology	26,363	26,923	26,917	27,783	27,597	27,426	27,422	28,246	29,796	31,794	34,663
Social sciences	30,754	31,543	31,218	31,603	30,785	29,826	29,387	29,994	30,069	30,660	33,238
Economics	4,767	5,712	6,050	6,843	7,247	7,515	7,673	7,954	7,618	7,537	7,655
Political sciences	8,620	9,212	9,271	9,859	10,228	10,165	10,300	10,580	10,919	10,964	12,486
Sociology	13,390	12,790	12,231	11,444	9,984	9,054	8,398	8,535	8,462	8,999	9,905
Other	3,977	3,829	3,666	3,457	3,326	3,092	3,016	2,925	3,070	3,160	3,192
Engineering, total	4,919	6,014	7,117	8,337	9,719	10,833	11,316	11,203	11,473	10,840	10,244
Aeronautical and astronautical	66	82	129	171	172	175	241	248	248	298	301
Chemical	1,055	1,287	1,365	1,612	1,789	2,077	2,093	1,606	1,540	1,132	1,170
Civil	1,049	1,087	1,231	1,318	1,484	1,423	1,342	1,229	1,196	1,171	1,174
Electrical	659	902	1,100	1,411	1,922	2,289	2,732	3,227	3,564	3,524	3,188
Industrial	428	545	767	952	1,000	1,071	1,167	1,281	1,384	1,245	1,261
Mechanical	620	893	1,151	1,266	1,485	1,812	1,801	1,710	1,727	1,764	1,680
Materials and metallurgy	182	223	265	318	286	321	285	335	297	316	261
Other	860	995	1,109	1,289	1,581	1,665	1,655	1,567	1,517	1,390	1,209

NOTE: For a list of subfields included in field categories, see pp. 3-10 of the National Science Foundation reference below. Data are collected on all degrees conferred between July 1 and June 30 from the universe of institutions of higher education in the 50 States, the District of Columbia (DC), and the U.S. territories.

SOURCE: U.S. Department of Education, National Center for Education Statistics (NCES), Degrees and Other Formal Awards Conferred and Completion surveys. Tabulations are published in National Science Foundation, Science and Engineering Degrees: 1966-89, A Source Book, NSF 91-314, 1991, pp. 27, 37-54.

Table 41. Science and engineering bachelor's degree recipients, by field of degree and racial/ethnic group: 1979, 1981, 1985, 1987, and 1989

Page 1 of 3

Field of degree (1)	1979	1981	1985	1987	1989
	Total, U.S. citizens and permanent residents (2)				
Total, science and engineering (3)	322,195	322,189	345,400	339,934	336,582
Sciences, total	264,192	253,803	257,992	254,800	257,857
Physical sciences	22,659	23,441	22,892	19,027	16,482
Mathematical sciences	11,534	10,717	14,212	15,506	14,524
Computer sciences	8,392	14,455	36,692	35,943	27,721
Biological sciences	48,674	43,143	38,047	37,294	35,462
Agricultural sciences	22,768	21,417	17,432	14,435	13,099
Psychology	42,561	40,878	39,406	41,248	47,184
Social sciences (4)	107,604	99,752	89,311	91,347	103,385
Engineering, total (5)	58,003	68,386	87,408	85,134	78,725
	White, non-Hispanic (2)				
Total, science and engineering (3)	284,852	281,924	299,662	289,700	283,260
Sciences, total	232,201	221,068	223,357	217,834	218,035
Physical sciences	20,958	21,249	20,541	16,653	14,238
Mathematical sciences	10,229	9,447	12,163	13,265	12,287
Computer sciences	7,404	12,566	31,321	29,181	21,711
Biological sciences	42,745	37,292	31,818	30,549	28,404
Agricultural sciences	21,700	20,237	16,430	13,485	12,190
Psychology	36,648	34,718	33,959	35,761	40,506
Social sciences (4)	92,517	85,559	77,125	78,940	88,699
Engineering, total (5)	52,651	60,856	76,305	71,866	65,225
	Black, non-Hispanic (2)				
Total, science and engineering (3)	18,743	18,828	18,075	18,279	18,405
Sciences, total	16,968	16,379	14,933	14,859	15,251
Physical sciences	704	911	830	823	697
Mathematical sciences	652	585	770	834	792
Computer sciences	507	786	2,143	2,820	2,457
Biological sciences	2,491	2,270	2,047	1,890	1,916
Agricultural sciences	346	380	370	295	309
Psychology	3,218	3,308	2,667	2,451	2,743
Social sciences (4)	9,050	8,139	6,106	5,746	6,337
Engineering, total (5)	1,775	2,449	3,142	3,420	3,154

See explanatory information and SOURCE at end of table.

Table 41. Science and engineering bachelor's degree recipients, by field of degree and racial/ethnic group 1979, 1981, 1985, 1987, and 1989

Page 2 of 3

Field of degree (1)	1979	1981	1985	1987	1989
			Asian (2)		
Total, science and engineering (3)	7,080	9,027	13,791	17,612	19,734
Sciences, total	5,222	5,961	8,784	11,234	12,831
Physical sciences	439	599	763	894	922
Mathematical sciences	324	392	885	1,034	1,019
Computer sciences	263	669	2,044	2,455	2,268
Biological sciences	1,464	1,493	1,952	2,565	2,907
Agricultural sciences	324	314	245	279	239
Psychology	781	843	845	1,154	1,575
Social sciences (4)	1,627	1,651	2,050	2,853	3,901
Engineering, total (5)	1,858	3,066	5,007	6,378	6,903
			Native American or Alaskan Native (2)		
Total, science and engineering (3)	1,187	1,202	1,484	1,350	1,323
Sciences, total	1,023	1,007	1,175	1,067	1,048
Physical sciences	63	65	98	72	62
Mathematical sciences	41	18	59	52	53
Computer sciences	11	21	139	112	90
Biological sciences	149	137	161	144	145
Agricultural sciences	84	96	70	58	70
Psychology	177	196	201	180	208
Social sciences (4)	498	474	447	449	420
Engineering, total (5)	164	195	309	283	275
			Hispanic (2)		
Total, science and engineering (3)	10,333	11,208	12,388	12,993	13,860
Sciences, total	8,778	9,388	9,743	9,806	10,692
Physical sciences	495	617	660	585	563
Mathematical sciences	288	275	335	321	373
Computer sciences	207	413	1,045	1,375	1,195
Biological sciences	1,825	1,951	2,069	2,146	2,090
Agricultural sciences	314	390	317	318	291
Psychology	1,737	1,813	1,734	1,702	4,028
Social sciences (4)	3,912	3,929	3,583	3,359	2,152
Engineering, total (5)	1,555	1,820	2,645	3,187	3,168

See explanatory information and SOURCE on next page.

Table 41. *Science and engineering bachelor's degree recipients, by field of degree and racial/ethnic group 1979, 1981, 1985, 1987, and 1989*

Page 3 of 3

---

(1) Data on racial/ethnic groups are collected by broad fields of study only; therefore, cannot be grouped using the exact field taxonomies reported in tables 38-40.

(2) Racial/ethnic categories are designated on the survey form. Data are provided by institutions. These categories include U.S. citizens and foreign citizens on permanent visas (resident aliens who have been admitted for permanent residency).

(3) Figures will not equal those in tables 38-40 because the field taxonomies are not the and may contain more fields.

(4) For 1979 and 1981, social sciences include "Afro-American black cultural studies" and "American Indian studies."

(5) Includes degrees in engineering technology. Racial/ethnic data for engineering and engineering technology separately are available for 1985-89 only.

NOTES: Data by racial/ethnic group were collected biennially from 1977 to 1989, but data for 1983 were not released by the National Center for Education Statistics.

SOURCE: U.S. Department of Education, National Center for Education Statistics (NCES). Biennial data are from the Higher Eduation General Information System (HEGIS) "Earned Degrees Survey," 1979-85, and the Integrated Postsecondary Education Data System (IPEDS) "Completions Survey," 1987-1989. Tabulations were done by the National Science Foundation, Science Resources Studies Division, and are unpublished.

BEST COPY AVAILABLE

Table 42. Total graduate enrollment in science and engineering, by field: 1982-90

Page 1 of 1

Field	1982	1983	1984 (1)	1985	1986	1987	1988	1989	1990
Total, science and engineering	340,707	349,547	352,027	360,722	370,487	375,632	378,274	386,047	401,569
Sciences, total	256,126	257,610	258,383	263,771	267,416	270,988	274,555	281,232	292,270
Physical sciences	28,199	29,466	30,064	30,995	32,260	32,738	32,972	33,628	34,337
Astronomy	632	618	639	671	689	722	731	789	811
Chemistry	17,015	17,801	17,756	18,309	18,745	18,824	18,578	18,817	19,142
Physics	10,306	10,811	11,335	11,677	12,443	12,810	13,312	13,660	13,985
Other	246	236	334	338	383	382	351	362	399
Mathematics	17,199	17,397	17,478	17,613	17,990	18,573	19,141	19,382	19,884
Computer sciences	19,812	23,616	25,810	29,844	31,425	32,137	32,787	32,846	34,507
Earth, atmospheric, and oceanographic sciences	15,174	15,544	15,612	15,545	15,163	14,522	14,032	13,848	14,159
Atmospheric science	889	896	907	964	961	952	940	912	929
Geoscience	9,621	10,321	10,370	10,294	9,819	8,998	8,495	8,082	7,742
Oceanography	2,091	2,063	2,102	2,081	2,128	2,127	2,033	2,207	2,252
Other	2,573	2,264	2,233	2,206	2,255	2,445	2,564	2,647	3,236
Agricultural and biological sciences	58,624	58,345	58,233	57,918	58,545	58,456	59,316	60,655	62,104
Agricultural sciences	12,314	12,290	12,062	11,380	11,329	11,004	11,000	11,038	11,183
Biological sciences	46,310	46,055	46,171	46,538	47,216	47,452	48,316	49,617	50,921
Psychology	40,082	41,039	41,074	41,308	41,551	42,888	44,389	46,304	48,659
Social sciences	77,036	72,203	70,112	70,548	70,482	71,674	71,918	74,569	78,620
Anthropology	5,948	5,644	5,590	5,621	5,795	5,825	5,935	6,128	6,494
Economics (except agricultural)	13,735	13,162	12,599	12,502	12,184	12,135	12,152	12,289	12,432
Sociology	7,246	6,920	6,740	6,567	6,504	6,945	7,045	7,358	7,756
Political science	29,887	28,050	25,921	27,012	27,251	27,608	27,856	29,079	30,698
Other	20,220	18,427	19,262	18,846	18,748	19,161	18,930	19,715	21,240
Engineering, total	84,581	91,937	93,644	96,951	103,071	104,644	103,719	104,815	109,299
Aerospace	1,941	2,408	2,445	2,658	2,924	3,121	3,318	3,559	4,006
Chemical	7,189	7,563	7,373	7,150	7,012	7,111	6,618	6,460	6,734
Civil	14,510	15,299	15,569	15,248	15,357	14,924	15,022	15,128	15,891
Electrical	22,017	25,213	26,306	28,128	30,008	31,339	31,960	33,161	33,887
Industrial	9,870	9,621	9,820	11,078	12,120	12,690	11,849	11,559	11,816
Mechanical	11,467	12,911	13,855	14,157	15,740	16,304	16,233	16,216	16,879
Materials and metallurgy	3,124	3,447	3,657	3,938	4,170	4,309	4,272	4,544	4,822
Other	14,463	15,475	14,619	14,594	15,740	14,846	14,447	14,188	15,264

(1) Includes estimated data for master's-granting institutions that were surveyed on a sample basis from 1984 to 1987

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Graduate Student Enrollment and Postdoctorates. Tabulations are published in Selected Data on Graduate Students and Postdoctorates in Science and Engineeering: Fall 1990, table 5, p. 6.

Table 43. Male graduate enrollment in science and engineering, by field: 1982-90

Page 1 of 1

Field	1982	1983	1984 (1)	1985	1986	1987	1988	1989	1990
Total, science and and engineering	236,602	242,234	243,683	249,089	255,324	257,686	256,113	258,889	266,292
Sciences, total	160,987	160,276	160,574	163,470	164,922	166,131	165,719	167,874	171,954
Physical sciences	22,776	23,586	23,904	24,483	25,395	25,620	25,473	25,825	26,223
Astronomy	531	526	541	563	568	602	591	649	646
Chemistry	12,855	13,289	13,116	13,518	13,719	13,648	13,112	13,154	13,280
Physics	9,238	9,609	10,043	10,179	10,866	11,137	11,561	11,792	12,047
Other	152	162	204	223	242	233	209	230	250
Mathematics	12,109	12,184	12,295	12,227	12,501	12,944	13,348	13,359	13,646
Computer sciences	14,366	16,968	18,905	22,387	23,677	24,233	24,564	24,880	26,316
Earth, atmospheric, and oceanographic sciences	11,393	11,593	11,694	11,571	11,183	10,708	10,164	9,923	9,994
Atmospheric science	764	766	769	807	782	784	777	734	744
Geoscience	7,318	7,808	7,882	7,810	7,463	6,834	6,383	6,106	5,798
Oceanography	1,514	1,497	1,501	1,471	1,461	1,493	1,388	1,482	1,500
Other	1,797	1,522	1,542	1,483	1,477	1,597	1,616	1,601	1,952
Agricultural and biological sciences	36,335	35,755	35,473	34,904	34,965	34,776	34,695	35,013	35,367
Agricultural sciences	9,314	9,183	8,963	8,422	8,384	8,061	7,927	7,924	7,865
Biological sciences	27,021	26,572	26,510	26,482	26,581	26,715	26,768	27,089	27,502
Psychology	16,977	16,687	16,216	15,778	15,459	15,744	15,643	15,906	15,963
Social sciences	47,031	43,503	42,087	42,120	41,742	42,106	41,832	42,968	44,445
Anthropology	2,677	2,438	2,439	2,507	2,457	2,479	2,497	2,548	2,680
Economics (except agricultural)	10,237	9,939	9,544	9,416	9,144	9,071	9,007	8,983	9,013
Sociology	3,376	3,255	3,120	3,085	2,965	3,135	3,241	3,392	3,484
Political science	18,616	17,277	16,161	16,492	16,511	16,672	16,444	16,995	17,518
Other	12,125	10,594	10,823	10,620	10,665	10,749	10,643	11,050	11,750
Engineering, total	75,615	81,958	83,109	85,619	90,402	91,555	90,394	91,015	94,338
Aerospace	1,831	2,283	2,311	2,490	2,722	2,895	3,086	3,314	3,714
Chemical	6,288	6,547	6,401	6,146	5,973	5,957	5,543	5,431	5,590
Civil	12,608	13,297	13,402	12,972	13,055	12,746	12,657	12,624	13,105
Electrical	20,466	23,157	24,112	25,719	27,104	28,263	28,705	29,661	30,107
Industrial	8,216	8,044	8,082	9,135	9,859	10,344	9,618	9,331	9,569
Mechanical	10,748	12,106	12,899	13,146	14,578	15,015	14,812	14,807	15,419
Materials and metallurgy	2,704	2,999	3,189	3,338	3,507	3,604	3,540	3,753	3,978
Other	12,754	13,525	12,713	12,673	13,604	12,731	12,433	12,094	12,856

(1) Includes estimated data for master's-granting institutions that were surveyed on a sample basis from 1984 to 1987

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Graduate Student Enrollments and Postdoctorates. Tabulations are published in Selected Data on Graduate Students and Postdoctorates in Science and Engineeering: Fall 1990, table 6, p. 7.

Table 44. Female graduate enrollment in science and engineering, by field: 1982-90

Page 1 of 1

Field	1982	1983	1984 (1)	1985	1986	1987	1988	1989	1990
Total, science and engineering	104,105	107,313	108,344	111,633	115,163	117,946	122,161	127,158	135,277
Sciences, total	95,139	97,334	97,809	100,301	102,494	104,857	108,836	113,358	120,316
Physical sciences	5,423	5,880	6,160	6,512	6,865	7,118	7,499	7,803	8,114
Astronomy	101	92	98	108	121	120	140	140	165
Chemistry	4,160	4,512	4,640	4,791	5,026	5,176	5,466	5,663	5,862
Physics	1,068	1,202	1,292	1,498	1,577	1,673	1,751	1,868	1,938
Other	94	74	130	115	141	149	142	132	149
Mathematics	5,090	5,213	5,183	5,386	5,489	5,629	5,793	6,023	6,238
Computer sciences	5,446	6,648	6,905	7,457	7,748	7,904	8,223	7,966	8,191
Earth, atmospheric, and oceanographic sciences	3,781	3,951	3,918	3,974	3,980	3,814	3,868	3,925	4,165
Atmospheric science	125	130	138	157	179	168	163	178	185
Geoscience	2,303	2,513	2,488	2,484	2,356	2,164	2,112	1,976	1,944
Oceanography	577	566	601	610	667	634	645	725	752
Other	776	742	691	723	778	848	948	1,046	1,284
Agricultural and biological sciences	22,289	22,590	22,760	23,014	23,580	23,680	24,621	25,642	26,737
Agricultural sciences	3,000	3,107	3,099	2,958	2,945	2,943	3,073	3,114	3,318
Biological sciences	19,289	19,483	19,661	20,056	20,635	20,737	21,548	22,528	23,419
Psychology	23,105	24,352	24,858	25,530	26,092	27,144	28,746	30,398	32,696
Social sciences	30,005	28,700	28,025	28,428	28,740	29,568	30,086	31,601	34,175
Anthropology	3,271	3,206	3,151	3,114	3,338	3,346	3,438	3,580	3,814
Economics (except agricultural)	3,498	3,223	3,055	3,086	3,040	3,064	3,145	3,306	3,419
Sociology	3,870	3,665	3,620	3,482	3,539	3,810	3,804	3,966	4,272
Political science	11,271	10,773	9,760	10,520	10,740	10,936	11,412	12,084	13,180
Other	8,095	7,833	8,439	8,226	8,083	8,412	8,287	8,665	9,490
Engineering, total	8,966	9,979	10,535	11,332	12,669	13,089	13,325	13,800	14,961
Aerospace	110	125	134	168	202	226	232	245	292
Chemical	901	1,016	972	1,004	1,039	1,154	1,075	1,029	1,144
Civil	1,902	2,002	2,167	2,276	2,302	2,178	2,365	2,504	2,786
Electrical	1,551	2,056	2,194	2,409	2,904	3,076	3,255	3,500	3,780
Industrial	1,654	1,577	1,738	1,943	2,261	2,346	2,231	2,228	2,247
Mechanical	719	805	956	1,011	1,162	1,289	1,421	1,409	1,460
Materials and metallurgy	420	448	468	600	663	705	732	791	844
Other	1,709	1,950	1,906	1,921	2,136	2,115	2,014	2,094	2,408

(1) Includes estimated data for master's-granting institutions that were surveyed on a sample basis from 1984 to 1987

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Graduate Student Enrollments and Postdoctorates. Tabulations are published in Selected Data on Graduate Students and Postdoctorates in Science and Engineering: Fall 1990, table 7, p. 8.

Table 45. Graduate enrollment in science and engineering, by field, enrollment status, and sex: 1990

Page 1 of 1

Field	Total, full- and part-time			Full-time			Part-time		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total, science and engineering	401,569	266,292	135,277	267,621	180,000	87,621	133,948	86,292	47,656
Sciences, total	292,270	171,954	120,316	201,074	122,274	78,800	91,196	49,680	41,516
Physical sciences	34,337	26,223	8,114	29,573	22,728	6,845	4,764	3,495	1,269
Mathematics	19,884	13,646	6,238	13,870	9,827	4,043	6,014	3,819	2,195
Computer sciences	34,507	26,316	8,191	16,872	13,372	3,500	17,635	12,944	4,691
Earth, atmospheric, and oceanographic sciences	14,159	9,994	4,165	10,295	7,345	2,950	3,864	2,649	1,215
Agricultural sciences	11,183	7,865	3,318	8,961	6,352	2,609	2,222	1,513	709
Biological sciences	50,921	27,502	23,419	41,685	23,241	18,444	9,236	4,261	4,975
Psychology	48,659	15,963	32,696	30,992	10,757	20,235	17,667	5,206	12,461
Social sciences	78,620	44,445	34,175	48,826	28,652	20,174	29,794	15,793	14,001
Engineering, total	109,299	94,338	14,961	66,547	57,726	8,821	42,752	36,612	6,140
Aerospace	4,006	3,714	292	3,010	2,811	199	996	903	93
Chemical	7,404	6,227	1,177	5,937	5,017	920	1,467	1,210	257
Civil	15,891	13,105	2,786	10,445	8,574	1,871	5,446	4,531	915
Electrical	33,887	30,107	3,780	18,710	16,731	1,979	15,177	13,376	1,801
Industrial	11,816	9,569	2,247	4,966	4,022	944	6,850	5,547	1,303
Mechanical	16,879	15,419	1,460	10,843	9,986	857	6,036	5,433	603
Materials and metallurgy	4,822	3,978	844	3,848	3,194	654	974	784	190
Other	14,594	12,219	2,375	8,788	7,391	1,397	5,806	4,828	978

NOTE: Figures represent graduate students in all institutions.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Graduate Students and Postdoctorates in Science and Engineering, unpublished tabulations, tables B-2 through B-6

Table 46. Graduate enrollment in science and engineering of U.S. citizens, by field and racial/ethnic group: 1983 and 1990

Page 1 of 1

Field	Total (1)		White, non-Hispanic		Black, non-Hispanic		Asian		Native American		Hispanic	
	1983	1990	1983	1990	1983	1990	1983	1990	1983	1990	1983	1990
Total, science and engineering	278,994	299,110	226,010	241,210	11,045	12,891	9,393	17,474	919	1,048	8,928	10,502
Sciences, total	214,676	227,938	176,909	186,869	9,634	11,081	5,974	10,699	738	891	7,463	8,547
Physical sciences	21,805	21,826	18,657	18,570	575	653	748	1,217	45	63	563	641
Mathematics	12,442	13,443	10,293	10,705	404	512	564	900	32	20	331	370
Computer sciences	18,068	23,778	13,482	17,436	564	984	1,099	2,864	22	42	282	566
Earth, atmospheric, and oceanographic sciences	13,679	11,442	12,322	10,476	111	125	239	267	27	30	226	241
Agricultural sciences	9,598	8,196	8,667	7,163	133	178	133	271	32	20	223	293
Biological sciences	39,969	39,195	34,998	33,180	1,163	1,263	1,276	2,314	121	137	915	1,237
Psychology	39,605	46,819	32,665	39,511	1,911	2,289	532	964	136	236	1,814	2,159
Social sciences	59,510	63,239	45,825	49,828	4,773	5,077	1,383	1,902	323	343	3,109	3,040
Engineering, total	64,318	71,172	49,101	54,341	1,411	1,810	3,419	6,775	181	157	1,465	1,955
Chemical	5,048	3,816	4,256	3,163	88	84	311	343	11	5	89	149
Civil	9,964	9,870	7,792	7,851	188	237	457	779	23	38	292	322
Electrical	17,631	22,342	12,199	15,728	367	610	1,171	3,009	48	49	394	578
Industrial	7,882	8,672	6,349	6,773	321	308	218	459	17	24	224	271
Mechanical	8,313	10,822	6,788	8,291	135	246	425	803	19	15	125	278
Other	15,480	15,650	11,717	12,535	312	325	837	1,382	63	26	341	357

(1) Total includes "other" and "unknown" racial/ethnic background.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Graduate Students and Postdoctorates in Science and Engineering, unpublished tabulations, table B-25.

Table 47. Median elapsed time (in years) between baccalaureate and completion of doctorate, by field, year of doctorate, and sex: 1980-90

Page 1 of 2

Field of doctorate	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
						Total					
Total, science and engineering	7.6	7.7	7.9	8.1	8.3	8.4	8.5	8.5	8.6	8.6	8.6
Sciences, total	7.6	7.6	7.8	8.1	8.3	8.4	8.6	8.7	8.7	8.7	8.7
Physical sciences	6.5	6.4	6.5	6.6	6.7	6.8	6.8	6.8	6.8	6.8	7.0
Mathematics	7.0	6.9	7.0	7.4	7.7	7.8	7.3	7.9	8.0	7.7	7.9
Computer sciences	7.4	7.7	7.7	8.5	8.8	8.9	9.1	9.0	9.5	9.0	8.9
Earth, atmospheric, and oceanographic sciences	8.1	8.3	8.3	8.4	8.8	8.8	9.0	9.0	9.4	9.2	9.1
Agricultural and biological sciences	7.1	7.1	7.3	7.6	7.9	8.0	8.3	8.3	8.4	8.6	8.5
Psychology	7.9	8.4	8.6	9.0	9.3	9.4	9.7	9.9	10.1	10.1	10.0
Social sciences	9.4	9.5	9.8	9.9	10.1	10.5	10.4	10.9	10.9	10.7	11.1
Engineering, total (1)	7.6	7.9	8.0	8.0	8.0	8.1	8.1	8.1	8.1	8.2	8.2
Chemical	6.5	6.6	6.9	6.7	6.7	6.8	6.8	6.7	6.8	6.7	6.8
Civil	8.4	8.4	8.5	8.5	8.5	8.7	8.7	9.2	8.9	9.2	9.3
Electrical	7.3	7.5	7.7	7.8	8.0	7.9	7.9	7.7	7.8	7.7	7.9
Materials	7.0	7.3	7.8	8.1	7.4	7.3	8.0	7.9	7.9	8.1	7.8
Mechanical	7.9	7.9	8.2	8.3	7.8	8.1	8.2	8.1	8.4	8.6	8.3
Total, non-science and engineering (2)	12.0	12.2	12.5	12.8	13.3	13.7	14.1	14.3	14.7	15.0	15.2
Total, all fields	9.3	9.4	9.6	9.8	10.0	10.2	10.4	10.4	10.5	10.5	10.5
						Males					
Total, science and engineering	7.5	7.6	7.8	7.9	8.1	8.2	8.3	8.4	8.4	8.4	8.4
Sciences, total	7.5	7.5	7.7	7.9	8.1	8.2	8.4	8.5	8.5	8.5	8.5
Physical sciences	6.5	6.4	6.5	6.6	6.7	6.8	6.9	6.9	6.9	6.9	7.1
Mathematics	6.9	6.9	7.0	7.3	7.7	7.8	7.2	7.7	7.9	7.7	7.8
Computer sciences	7.3	7.7	7.6	8.4	8.7	8.7	9.1	9.0	9.3	8.6	8.6
Earth, atmospheric, and oceanographic sciences	8.1	8.4	8.4	8.5	8.9	8.8	8.9	9.1	9.4	9.2	8.9
Agricultural and biological sciences	7.1	7.1	7.3	7.6	7.9	8.0	8.3	8.4	8.4	8.6	8.5
Psychology	7.7	8.2	8.3	8.8	9.1	9.3	9.6	9.9	9.9	10.2	10.1
Social sciences	9.3	9.3	9.6	9.7	9.9	10.2	10.2	10.6	10.6	10.2	10.5
Engineering, total (1)	7.7	7.9	8.0	8.0	8.0	8.2	8.2	8.2	8.2	8.2	8.2
Chemical	6.6	6.6	7.0	6.7	6.7	6.9	6.9	6.6	6.9	6.8	6.8
Civil	8.4	8.4	8.4	8.5	8.6	8.7	8.7	9.2	8.9	9.1	9.2
Electrical	7.3	7.5	7.7	7.8	8.0	7.9	7.9	7.8	7.9	7.8	8.0
Materials	7.0	7.3	8.0	8.1	7.7	7.3	8.1	8.0	8.0	8.1	7.8
Mechanical	8.0	7.9	8.2	8.3	7.9	8.2	8.3	8.1	8.5	8.6	8.3
Total, non-science and engineering (2)	11.6	11.7	12.1	12.4	12.8	13.1	13.4	13.5	13.9	14.1	14.1
Total, all fields	8.8	8.8	9.0	9.1	9.3	9.5	9.5	9.7	9.7	9.7	9.6

See explanatory information and SOURCE at end of table.

Table 47. Median elapsed time (in years) between baccalaureate and completion of doctorate, by field, year of doctorate, and sex: 1980-90

Page 2 of 2

Field of doctorate	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
	Females										
Total, science and engineering	8.0	8.1	8.3	8.6	8.7	8.9	9.1	9.1	9.1	9.1	9.1
Sciences, total	8.0	8.2	8.3	8.6	8.8	9.0	9.2	9.1	9.2	9.2	9.3
Physical sciences	6.1	6.4	6.4	6.6	6.5	6.6	6.5	6.6	6.5	6.6	6.9
Mathematics	8.2	7.3	7.6	7.5	7.9	7.6	8.0	9.4	8.6	7.9	8.3
Computer sciences	8.3	7.8	10.0	10.0	11.0	11.5	9.3	9.3	11.1	12.5	11.4
Earth, atmospheric, and oceanographic sciences	8.0	7.6	7.7	8.0	8.7	8.7	9.3	8.4	9.0	9.3	9.6
Agricultural and biological sciences	7.2	7.2	7.3	7.6	7.9	8.3	8.3	8.3	8.4	8.5	8.6
Psychology	8.3	8.6	9.0	9.2	9.4	9.5	9.9	9.9	10.3	10.1	10.0
Social sciences	9.8	10.0	10.4	10.5	10.8	11.6	10.9	11.4	11.7	11.7	12.1
Engineering, total (1)	6.6	7.1	7.6	7.7	7.3	7.1	7.6	7.3	7.0	7.3	7.8
Chemical	--	--	--	6.5	6.2	6.3	6.4	6.9	6.1	6.3	6.4
Civil	--	--	--	--	--	--	--	--	7.0	10.5	10.7
Electrical	--	--	--	--	--	7.4	8.5	6.1	6.8	6.6	7.2
Materials	--	--	--	--	--	8.0	--	7.7	6.8	7.9	7.4
Mechanical	--	--	--	--	--	6.7	--	--	7.8	7.5	8.6
Total, non-science and engineering (2)	12.6	13.0	13.2	13.4	14.0	14.5	14.9	15.1	15.5	16.0	16.2
Total, all fields	10.5	10.9	11.0	11.2	11.6	12.0	12.1	12.2	12.4	12.5	12.6

Double dashes (--) represent too few cases to estimate; median not calculated for cells with fewer than 20 cases.

(1) Total engineering includes engineering fields not separately shown.
(2) Non-science and engineering doctorates include doctorates in fields of specialization that are unclassified.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. Tabulations are published in Science and Engineering Doctorates: 1960-90, NSF 91-310 final, table 5, pp. 152-153.

Table 48. Total science and engineering master's degree recipients, by field of degree: 1979-89

Page 1 of 1

Field of degree	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total, science and and engineering	54,456	54,391	54,811	57,025	58,868	59,569	61,278	62,526	63,018	63,897	66,026
Sciences, total	38,263	37,545	37,438	38,431	39,147	39,217	40,072	41,212	40,735	41,006	42,098
Physical sciences	3,687	3,440	3,424	3,514	3,329	3,586	3,642	3,676	3,587	3,730	3,876
Astronomy	116	79	58	80	68	67	91	83	71	88	100
Chemistry	1,765	1,733	1,667	1,758	1,632	1,677	1,734	1,764	1,750	1,702	1,800
Physics	1,319	1,192	1,294	1,284	1,370	1,535	1,523	1,501	1,543	1,681	1,739
Other	487	436	405	392	259	307	294	328	223	259	237
Mathematics	3,046	2,868	2,569	2,731	2,839	2,749	2,888	3,171	3,327	3,434	3,431
Computer sciences	3,055	3,647	4,218	4,935	5,321	6,190	7,101	8,070	8,481	9,166	9,399
Earth, atmospheric, and oceanographic sciences	1,777	1,793	1,876	2,012	1,959	1,982	2,160	2,234	2,051	1,920	1,819
Atmospheric science	181	170	174	164	183	246	236	204	216	191	206
Geoscience	1,435	1,481	1,527	1,682	1,673	1,617	1,806	1,895	1,729	1,630	1,511
Oceanography	161	142	175	166	103	119	118	135	106	99	102
Agricultural and biological sciences	10,719	10,278	9,731	9,824	9,720	9,330	8,757	8,572	8,831	8,559	8,430
Agricultural sciences	3,499	3,424	3,432	3,640	3,679	3,613	3,412	3,283	3,571	3,497	3,270
Biological sciences	7,220	6,854	6,299	6,184	6,041	5,717	5,345	5,289	5,260	5,062	5,160
Psychology	8,031	7,861	8,039	7,849	8,439	8,073	8,481	8,363	8,165	7,925	8,652
Social sciences	7,948	7,658	7,581	7,566	7,540	7,307	7,043	7,126	6,295	6,272	6,491
Economics	2,468	2,386	2,498	2,506	2,568	2,482	2,532	2,496	1,865	1,840	1,877
Sociology	1,451	1,372	1,255	1,183	1,157	1,015	1,045	986	970	1,013	1,169
Political sciences	2,038	1,938	1,876	1,955	1,829	1,770	1,500	1,704	1,618	1,577	1,593
Other	1,991	1,962	1,952	1,922	1,986	2,040	1,966	1,940	1,842	1,842	1,852
Engineering, total	16,193	16,846	17,373	18,594	19,721	20,352	21,206	21,314	22,281	22,891	23,928
Aeronautical and astronautical	372	382	408	521	491	562	605	621	737	797	855
Chemical	1,276	1,393	1,406	1,409	1,545	1,798	1,814	1,641	1,386	1,322	1,321
Civil	3,165	3,198	3,428	3,456	3,504	3,551	3,542	3,281	3,267	3,134	3,296
Electrical	3,596	3,842	3,902	4,465	4,819	5,519	5,649	6,147	6,895	7,455	7,849
Industrial	1,502	1,313	1,631	1,656	1,432	1,557	1,463	1,653	1,719	1,816	1,823
Mechanical	2,012	2,194	2,419	2,539	2,683	2,964	3,272	3,256	3,380	3,513	3,703
Materials and metallurgy	492	566	608	609	628	684	676	783	752	727	815
Other	3,778	3,958	3,571	3,939	4,619	3,717	4,185	3,932	4,145	4,127	4,266

NOTE: For a list of subfields included in field categories, see pp 3-10 of the National Science Foundation reference below. Data are collected on all degrees conferred between July 1 and June 30 from the universe of institutions of higher education in the 50 States, the District of Columbia (DC), and the U.S. territories.

SOURCE: U.S. Department of Education, National Center for Education Statistics (NCES), Degrees and Other Formal Awards Conferred and Completion surveys. Tabulations are published in National Science Foundation, Science and Engineering Degrees: 1966-89, A Source Book, NSF 91-314, 1991, pp. 29, 37-54.

Table 49. Male science and engineering master's degree recipients, by field of degree: 1979-89

Page 1 of 1

Field of degree	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total, science and engineering	40,416	40,008	39,797	41,049	41,787	41,894	44,979	43,344	43,480	44,416	45,262
Sciences, total	25,213	24,352	23,830	24,139	23,942	23,701	24,101	24,501	24,040	24,379	24,466
Physical sciences	3,005	2,801	2,743	2,765	2,636	2,736	2,811	2,759	2,694	2,838	2,836
Astronomy	101	70	49	69	56	57	76	72	55	71	85
Chemistry	1,318	1,286	1,194	1,261	1,167	1,139	1,166	1,165	1,181	1,148	1,131
Physics	1,184	1,074	1,179	1,128	1,208	1,341	1,333	1,277	1,300	1,428	1,448
Other	402	371	321	307	205	199	236	245	158	191	172
Mathematics	1,989	1,832	1,692	1,821	1,859	1,795	1,877	2,055	2,026	2,057	2,061
Computer sciences	2,480	2,883	3,247	3,625	3,813	4,379	5,064	5,658	5,985	6,702	6,773
Earth, atmospheric, and oceanographic sciences	1,467	1,457	1,470	1,560	1,515	1,517	1,639	1,717	1,531	1,433	1,337
Atmospheric science	165	156	154	140	159	213	196	172	187	155	174
Geoscience	1,165	1,186	1,175	1,301	1,279	1,216	1,361	1,444	1,272	1,209	1,099
Oceanography	137	115	141	119	77	88	82	101	72	69	64
Agricultural and biological sciences	7,259	6,952	6,451	6,315	6,111	5,728	5,265	5,022	5,180	5,011	4,849
Agricultural sciences	2,749	2,627	2,598	2,694	2,690	2,561	2,456	2,280	2,496	2,441	2,249
Biological sciences	4,510	4,325	3,853	3,621	3,421	3,167	2,809	2,742	2,684	2,570	2,600
Psychology	3,688	3,397	3,371	3,228	3,254	2,980	3,064	2,937	2,838	2,599	2,814
Social sciences	5,325	5,030	4,856	4,825	4,754	4,566	4,381	4,353	3,786	3,739	3,796
Economics	2,018	1,907	1,941	1,913	1,957	1,891	1,920	1,880	1,389	1,370	1,345
Sociology	757	683	598	541	515	461	470	440	425	437	507
Political sciences	1,480	1,423	1,342	1,345	1,286	1,233	1,062	1,154	1,111	1,055	1,074
Other	1,070	1,017	975	1,026	996	981	929	879	861	877	870
Engineering, total	15,203	15,656	15,967	16,910	17,845	18,193	18,878	18,843	19,440	20,037	20,796
Aeronautical and astronautical	355	373	388	482	454	535	574	578	682	734	791
Chemical	1,156	1,249	1,230	1,222	1,369	1,590	1,529	1,401	1,143	1,107	1,092
Civil	2,951	2,933	3,112	3,104	3,122	3,136	3,128	2,908	2,792	2,721	2,851
Electrical	3,453	3,658	3,681	4,177	4,484	5,081	5,154	5,508	6,178	6,642	6,933
Industrial	1,374	1,180	1,465	1,446	1,226	1,279	1,236	1,374	1,400	1,492	1,465
Mechanical	1,939	2,087	2,292	2,388	2,517	2,765	3,044	3,002	3,133	3,218	3,377
Materials and metallurgy	441	508	535	539	531	567	564	650	590	576	634
Other	3,534	3,668	3,264	3,552	4,142	3,240	3,649	3,422	3,522	3,547	3,653

NOTE: For a list of subfields included in field categories, see pp 3-10 of the National Science Foundation reference below. Data are collected on all degrees conferred between July 1 and June 30 from the universe of institutions of higher education in the 50 States, the District of Columbia (DC), and the U.S. territories.

SOURCE: U.S. Department of Education, National Center for Education Statistics (NCES), Degrees and Other Formal Awards Conferred and Completion surveys. Tabulations are published in National Science Foundation, Science and Engineering Degrees: 1966-89, A Source Book, NSF 91-314, 1991, pp. 30, 37-54.

Table 50. Female science and engineering master's degree recipients, by field of degree: 1979-89

Page 1 of 1

Field of degree	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total, science and and engineering	14,040	14,383	15,014	15,976	17,081	17,675	18,299	19,182	19,538	19,481	20,764
Sciences, total	13,050	13,193	13,608	14,292	15,205	15,516	15,971	16,711	16,697	16,627	17,632
Physical sciences	682	639	681	749	693	850	831	917	893	892	1,040
Astronomy	15	9	9	11	12	10	15	11	16	17	15
Chemistry	447	447	473	497	465	538	568	599	569	554	669
Physics	135	118	115	156	162	194	190	224	243	253	291
Other	85	65	84	85	54	108	58	83	65	68	65
Mathematics	1,057	1,036	877	910	980	954	1,011	1,116	1,301	1,377	1,370
Computer sciences	575	764	971	1,310	1,508	1,811	2,037	2,412	2,496	2,464	2,626
Earth, atmospheric, and oceanographic sciences	310	336	406	452	444	465	521	517	520	487	482
Atmospheric science	16	14	20	24	24	33	40	32	29	36	32
Geoscience	270	295	352	381	394	401	445	451	457	421	412
Oceanography	24	27	34	47	26	31	36	34	34	30	38
Agricultural and biological sciences	3,460	3,326	3,280	3,509	3,609	3,602	3,492	3,550	3,651	3,548	3,581
Agricultural sciences	750	797	834	946	989	1,052	956	1,003	1,075	1,056	1,021
Biological sciences	2,710	2,529	2,446	2,563	2,620	2,550	2,536	2,547	2,576	2,492	2,560
Psychology	4,343	4,464	4,668	4,621	5,185	5,093	5,417	5,426	5,327	5,326	5,838
Social sciences	2,623	2,628	2,725	2,741	2,786	2,741	2,662	2,773	2,509	2,533	2,695
Economics	450	479	557	593	611	591	612	616	476	470	532
Sociology	694	689	657	642	642	554	575	546	545	576	662
Political sciences	558	515	534	610	543	537	438	550	507	522	519
Other	921	945	977	896	990	1,059	1,037	1,061	981	965	982
Engineering, total	990	1,190	1,406	1,684	1,876	2,159	2,328	2,471	2,841	2,854	3,132
Aeronautical and and astronautical	17	9	20	39	37	27	31	43	55	63	64
Chemical	120	144	176	187	176	208	285	240	243	215	229
Civil	214	265	316	352	382	415	414	373	475	413	445
Electrical	143	184	221	288	335	438	495	639	717	813	916
Industrial	128	133	166	210	206	278	227	279	319	324	358
Mechanical	73	107	127	151	166	199	228	254	247	295	326
Materials and metallurgy	51	58	73	70	97	117	112	133	162	151	181
Other	244	290	307	387	477	477	536	510	623	580	613

NOTE: For a list of subfields included in field categories, see pp 3-10 of the National Science Foundation referemce below. Data are collected on all degrees conferred between July 1 and June 30 from the universe of institutions of higher education in the 50 States, the District of Columbia (DC), and the U.S. territories.

SOURCE: U.S. Department of Education, National Center for Education Statistics (NCES), Degrees and Other Formal Awards Conferred and Completion surveys. Tabulations are published in National Science Foundation, Science and Engineering Degrees: 1966-89, A Source Book, NSF 91-314, 1991, pp. 31, 37-54.

Table 51. Science and engineering master's degree recipients, by field of degree and racial/ethnic group: 1979, 1981, 1985, 1987, and 1989

Page 1 of 3

Field of degree (1)	1979	1981	1985	1987	1989
	Total, U.S. citizens and permanent residents (2)				
Total, science and engineering (3)	50,201	48,711	51,118	50,720	51,872
Sciences, total	38,784	36,909	36,209	34,773	35,510
Physical sciences	4,713	4,457	4,583	4,271	4,232
Mathematical sciences	2,571	2,103	2,152	2,331	2,309
Computer sciences	2,528	3,239	5,233	5,848	6,061
Biological sciences	6,415	5,647	4,568	4,239	4,169
Agricultural sciences	3,282	3,307	3,107	2,724	2,392
Psychology	7,852	7,769	8,156	7,493	7,994
Social sciences (4)	11,423	10,387	8,410	7,867	8,353
Engineering, total (5)	11,417	11,802	14,909	15,947	16,362
	White, non-Hispanic (2)				
Total, science and engineering (3)	45,185	43,435	44,387	43,715	44,316
Sciences, total	35,103	33,288	31,808	30,476	30,894
Physical sciences	4,373	4,115	4,133	3,834	3,766
Mathematical sciences	2,352	1,890	1,873	2,012	2,032
Computer sciences	2,273	2,818	4,303	4,717	4,786
Biological sciences	5,862	5,213	4,081	3,745	3,679
Agricultural sciences	3,047	3,083	2,865	2,491	2,199
Psychology	7,078	7,019	7,220	6,698	7,075
Social sciences (4)	10,118	9,150	7,333	6,979	7,357
Engineering, total (5)	10,082	10,147	12,579	13,239	13,422
	Black, non-Hispanic (2)				
Total, science and engineering (3)	1,988	1,787	1,755	1,803	1,688
Sciences, total	1,742	1,527	1,396	1,370	1,287
Physical sciences	86	107	89	79	78
Mathematical sciences	71	67	53	73	59
Computer sciences	65	70	180	207	198
Biological sciences	217	171	151	167	124
Agricultural sciences	79	73	75	78	53
Psychology	476	424	426	376	395
Social sciences (4)	748	615	422	390	380
Engineering, total (5)	246	260	359	433	401

See explanatory information and SOURCE at end of table.

Table 51. Science and engineering master's degree recipients, by field of degree and racial/ethnic group: 1979, 1981, 1985, 1987, and 1989

Page 2 of 3

Field of degree (1)	1979	1981	1985	1987	1989
			Asians (2)		
Total, science and engineering (3)	1,895	2,132	3,276	3,475	4,100
Sciences, total	1,045	1,053	1,703	1,783	2,073
Physical sciences	160	153	213	227	278
Mathematical sciences	104	97	164	183	178
Computer sciences	149	279	615	779	894
Biological sciences	205	145	179	190	223
Agricultural sciences	104	67	75	57	53
Psychology	87	77	129	113	131
Social sciences (4)	236	235	328	234	316
Engineering, total (5)	850	1,079	1,573	1,692	2,027
			Native Americans (2)		
Total, science and engineering (3)	163	159	222	171	205
Sciences, total	139	128	173	108	170
Physical sciences	29	11	21	9	18
Mathematical sciences	8	7	7	3	6
Computer sciences	16	12	41	22	39
Biological sciences	16	15	18	11	17
Agricultural sciences	5	7	6	6	6
Psychology	20	32	37	35	33
Social sciences (4)	45	44	43	22	51
Engineering, total (5)	24	31	49	63	35
			Hispanics (2)		
Total, science and engineering (3)	970	1,198	1,478	1,556	1,563
Sciences, total	755	913	1,129	1,036	1,086
Physical sciences	65	71	127	122	92
Mathematical sciences	36	42	55	60	34
Computer sciences	25	60	94	123	144
Biological sciences	115	103	139	126	126
Agricultural sciences	47	77	86	92	81
Psychology	191	217	344	271	360
Social sciences (4)	276	343	284	242	249
Engineering, total (5)	215	285	349	520	477

See explanatory information and SOURCE on next page.

Table 51. Science and engineering master's degree recipients, by field of degree
and racial/ethnic group: 1979, 1981, 1985, 1987, and 1989

---

(1) Data on racial/ethnic groups are collected by broad fields of study only; therefore, fields cannot be grouped using the exact field taxonomies reported in tables 48-50.

(2) Racial/ethnic categories are designated on the survey form. Data are provided by institutions. These categories include U.S. citizens and foreign citizens on permanent visas (resident aliens who have been admitted for permanent residency).

(3) Figures will not equal those in tables 48-50 because the field taxonomies are not the same and may contain more fields.

(4) For 1979 and 1981, social sciences included "Afro-American black cultural studies" and "American Indian studies."

(5) Includes degrees in engineering technology. Racial/ethnic data for engineering and engineering technology separately are available for 1985-1989 only.

NOTES: Data by racial/ethnic group were collected biennially from 1977 to 1989, but data for 1983 were not released by the National Center for Education Statistics.

SOURCE: U.S. Department of Education, National Center for Education Statistics (NCES). Biennial data are from the Higher Education General Information System (HEGIS) Earned Degrees Survey, 1979-85, and Integrated Postsecondary Education Data System (IPEDS) Completion Survey, 1987-89. Tabulations were done by the National Science Foundation, Science Resources Studies Division, and are unpublished.

Table 52. Total science and engineering doctorate recipients, by field of doctorate: 1979-89

Page 1 of 1

Field of doctorate	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total, science and engineering	17,624	17,550	18,024	18,038	18,423	18,545	18,735	19,279	19,733	20,762	21,541
Sciences, total	15,130	15,071	15,496	15,392	15,642	15,632	15,569	15,903	16,022	16,573	17,005
Physical sciences	2,674	2,521	2,627	2,694	2,815	2,851	2,934	3,120	3,238	3,352	3,267
Astronomy	115	121	109	102	115	98	100	109	100	130	113
Chemistry	1,566	1,538	1,612	1,680	1,759	1,765	1,836	1,903	1,975	2,016	1,971
Physics	993	862	906	912	928	982	980	1,078	1,137	1,173	1,165
Other	NA	NA	NA	NA	13	6	18	30	26	33	18
Mathematics	769	744	728	720	701	698	688	729	740	749	861
Computer sciences	210	218	232	220	286	295	310	399	450	515	612
Earth, atmospheric, and oceanographic sciences	642	628	583	657	624	608	599	559	602	695	720
Atmospheric science	84	90	75	65	97	81	80	78	87	103	86
Geoscience	383	388	354	406	368	383	385	346	375	425	454
Oceanography	122	110	100	133	109	99	92	100	111	109	112
Other	53	40	54	53	50	45	42	35	29	58	68
Agricultural and biological sciences	4,501	4,715	4,786	4,844	4,756	4,877	4,903	4,805	4,812	5,123	5,192
Agricultural sciences	855	912	982	951	1,015	997	1,111	998	976	1,015	1,086
Biological sciences	3,646	3,803	3,804	3,893	3,741	3,880	3,792	3,807	3,836	4,108	4,106
Psychology	3,091	3,098	3,358	3,159	3,347	3,257	3,117	3,124	3,169	3,064	3,209
Social sciences	3,243	3,147	3,182	3,098	3,113	3,046	3,018	3,167	3,011	3,075	3,144
Economics	956	927	993	940	970	952	959	1,018	959	1,008	1,062
Sociology	632	601	605	568	551	534	486	506	449	468	456
Political sciences	603	585	532	536	542	568	554	571	569	542	601
Other	1,052	1,034	1,052	1,054	1,050	992	1,019	1,072	1,034	1,057	1,025
Engineering, total	2,494	2,479	2,528	2,646	2,781	2,913	3,166	3,376	3,711	4,189	4,536
Aeronautical and astronautical	81	81	97	86	106	119	124	118	142	150	177
Chemical	315	316	317	333	392	409	504	531	584	686	711
Civil	302	306	358	368	397	408	391	429	477	532	540
Electrical	611	540	549	616	625	660	716	806	779	1,009	1,135
Industrial	82	77	66	79	86	84	92	101	120	127	161
Mechanical	366	384	360	437	379	427	513	536	656	715	757
Materials and metallurgy	236	273	234	255	268	271	303	305	392	374	379
Other	501	502	547	472	528	535	523	550	561	596	676

NA=not available

NOTE: (1) Information is collected from all recipients of research doctorates for the period of July 1 to June 30 each year. A research doctorate requirement is the completion of original research. There is 100-percent coverage for data by field and sex of recipient.
(2) For a list of subfields included in field categories, see pp. 3-10 of the National Science Foundation reference below.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. Tabulations are published in National Science Foundation, Science and Engineering Degrees: 1966-89, A Source Book, NSF 91-314, 1991, pp. 33, 37-54.

Table 53. Male science and engineering doctorate recipients, by field of doctorate: 1979-89

Page 1 of 1

Field of doctorate	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total, science and engineering	13,936	13,652	13,895	13,755	13,780	13,821	13,914	148,181	14,482	15,178	15,533
Sciences, total	11,504	11,263	11,466	11,233	11,123	11,059	10,946	11,030	11,013	11,275	11,370
Physical sciences	2,382	2,199	2,318	2,337	2,442	2,452	2,467	2,610	2,710	2,785	2,650
Astronomy	107	108	98	86	100	86	89	100	87	114	97
Chemistry	1,347	1,283	1,376	1,407	1,462	1,445	1,474	1,507	1,569	1,589	1,474
Physics	928	808	844	844	869	915	889	978	1,030	1,059	1,063
Other	NA	NA	NA	NA	11	6	15	25	24	23	16
Mathematics	650	649	616	624	588	583	582	608	615	628	705
Computer sciences	183	197	206	200	250	258	277	351	385	459	505
Earth, atmospheric, and oceanographic sciences	584	564	527	554	529	502	491	464	490	560	574
Atmospheric science	81	82	72	61	91	73	76	70	73	92	76
Geoscience	345	353	321	341	315	321	310	278	299	343	363
Oceanography	112	95	91	110	84	72	69	89	95	83	87
Other	46	34	43	42	39	36	36	27	23	42	48
Agricultural and biological sciences	3,470	3,565	3,565	3,552	3,390	3,529	3,494	3,353	3,281	3,434	3,430
Agricultural sciences	775	815	848	800	882	864	940	826	805	829	858
Biological sciences	2,695	2,750	2,717	2,752	2,508	2,665	2,554	2,527	2,476	2,605	2,572
Psychology	1,831	1,787	1,885	1,721	1,750	1,626	1,576	1,526	1,474	1,388	1,409
Social sciences	2,404	2,302	2,349	2,245	2,174	2,109	2,059	2,118	2,058	2,021	2,097
Economics	840	811	879	820	819	799	814	837	796	810	864
Sociology	400	370	363	354	323	300	243	285	274	219	225
Political science	490	472	424	419	418	438	407	405	413	407	436
Other	674	649	683	652	614	572	595	591	575	585	572
Engineering, total	2,432	2,389	2,429	2,522	2,657	2,762	2,968	3,151	3,469	3,903	4,163
Aeronautical and astronautical	81	80	97	85	104	117	119	117	132	141	169
Chemical	306	302	306	314	369	382	463	470	524	621	631
Civil	298	295	348	351	384	383	371	408	459	502	485
Electrical	600	523	527	594	612	645	681	768	747	961	1,068
Industrial	77	70	60	73	80	68	86	87	107	108	143
Mechanical	361	377	354	420	371	412	487	518	639	686	728
Materials and metallurgy	228	259	217	238	238	245	271	281	347	341	335
Other	481	483	520	447	499	510	490	502	514	543	604

NA=not available.

NOTE: (1) Information is collected from all recipients of research doctorates for the period of July 1 to June 30 each year. A research doctorate requirement is the completion of original research. There is 100-percent coverage for data by field and sex of recipient.
(2) For a list of subfields included in field categories, see pp. 3-10 of the National Science Foundation reference below.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. Tabulations are published in National Science Foundation, Science and Engineering Degrees: 1966-89, A Source Book, NSF 91-314, 1991, pp. 34, 37-54.

Table 54. Female science and engineering doctorate recipients, by field of doctorate: 1979-89

Page 1 of 1

Field of doctorate	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total, science and engineering	3,688	3,898	4,129	4,283	4,643	4,724	4,821	5,098	5,251	5,584	6,008
Sciences, total	3,626	3,808	4,030	4,091	4,519	4,573	4,623	4,873	5,009	5,298	5,635
Physical sciences	292	322	309	357	373	399	467	510	528	567	617
Astronomy	8	13	11	16	15	12	11	9	13	16	16
Chemistry	219	255	236	273	297	320	362	396	406	427	497
Physics	65	54	62	68	59	67	91	100	107	114	102
Other	NA	NA	NA	NA	2	0	3	5	2	10	2
Mathematics	119	95	112	96	113	115	106	121	125	121	156
Computer sciences	27	21	26	20	36	37	33	48	65	56	107
Earth, atmospheric, and oceanographic sciences	58	64	56	103	95	106	108	95	112	135	146
Atmospheric science	3	8	3	4	6	8	4	8	14	11	10
Geoscience	38	35	33	65	53	62	75	68	76	82	91
Oceanography	10	15	9	23	25	27	23	11	16	26	25
Other	7	6	11	11	11	9	6	8	6	16	20
Agricultural and biological sciences	1,031	1,150	1,221	1,292	1,366	1,348	1,409	1,452	1,531	1,689	1,762
Agricultural sciences	80	97	134	151	133	133	171	172	171	186	228
Biological sciences	951	1,053	1,087	1,141	1,233	1,215	1,238	1,280	1,360	1,503	1,534
Psychology	1,260	1,311	1,473	1,438	1,597	1,631	1,541	1,598	1,695	1,676	1,800
Social sciences	839	845	833	853	939	937	959	1,049	953	1,054	1,047
Economics	116	116	114	120	151	153	145	181	163	198	198
Sociology	232	231	242	214	228	234	243	221	175	249	231
Political sciences	113	113	108	117	124	130	147	166	156	135	165
Other	378	385	369	402	436	420	424	481	459	472	453
Engineering, total	62	90	99	124	124	151	198	225	242	286	373
Aeronautical and astronautical	0	1	0	1	2	2	5	1	10	9	8
Chemical	9	14	11	19	23	27	41	61	60	65	80
Civil	4	11	10	17	13	25	20	21	18	30	55
Electrical	11	17	22	22	13	15	35	38	32	48	67
Industrial	5	7	6	6	6	16	6	14	13	19	18
Mechanical	5	7	6	17	8	15	26	18	17	29	29
Materials and metallurgy	8	14	17	17	30	26	32	24	45	33	44
Other	20	19	27	25	29	25	33	48	47	53	72

NA=not available.

NOTE: (1) Information is collected from all recipients of research doctorates for the period of July 1 to June 30 each year. A research doctorate requirement is the completion of original research. There is 100-percent coverage for data by field and sex of recipient.

(2) For a list of subfields included in field categories, see pp. 3-10 of the National Science Foundation reference below.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. Tabulations are published in National Science Foundation, Science and Engineering Degrees: 1966-89, A Source Book, NSF 91-314, 1991, pp. 35, 37-54.

Table 55. Science and engineering doctorate recipients, by field of doctorate and sex--total: 1980-90

Page 1 of 1

Field of doctorate and sex	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total, science and engineering											
Male	13,639	13,880	13,747	13,769	13,810	13,900	14,167	14,472	15,164	15,522	16,399
Female	3,884	4,116	4,270	4,624	4,704	4,812	5,084	5,235	5,577	6,008	6,274
Sciences, total											
Male	11,250	11,451	11,225	11,112	11,048	10,932	11,016	11,002	11,260	11,353	11,921
Female	3,794	4,017	4,146	4,500	4,553	4,614	4,859	4,993	5,291	5,633	5,860
Physical sciences											
Male	2,199	2,318	2,337	2,431	2,446	2,452	2,585	2,686	2,760	2,627	2,843
Female	322	309	357	371	399	464	505	526	557	617	651
Mathematics											
Male	649	616	624	588	583	582	608	615	628	704	734
Female	95	112	96	113	115	106	121	125	121	155	158
Computer sciences											
Male	197	206	200	250	258	277	351	385	459	504	594
Female	21	26	20	36	37	33	48	65	56	108	110
Earth, atmospheric, and oceanographic sciences											
Male	564	527	554	540	508	506	489	514	583	590	620
Female	64	56	103	97	106	111	100	114	145	150	149
Agricultural and biological sciences											
Male	3,565	3,565	3,552	3,390	3,529	3,495	3,353	3,284	3,436	3,433	3,657
Female	1,150	1,221	1,292	1,366	1,348	1,409	1,452	1,532	1,691	1,770	1,852
Psychology											
Male	1,787	1,885	1,721	1,750	1,626	1,576	1,526	1,474	1,388	1,406	1,361
Female	1,311	1,473	1,438	1,597	1,631	1,541	1,598	1,695	1,676	1,797	1,906
Social sciences											
Male	2,289	2,334	2,237	2,163	2,098	2,044	2,104	2,044	2,006	2,089	2,112
Female	831	820	840	920	917	950	1,035	936	1,045	1,036	1,034
Engineering, total											
Male	2,389	2,429	2,522	2,657	2,762	2,968	3,151	3,470	3,904	4,169	4,478
Female	90	99	124	124	151	198	225	242	286	375	414

NOTE: (1) For a list of subfields included in field categories, see table 1, pp. 7-9, of the source below.
(2) These data are for all doctorate recipients, including those whose citizenship is unknown.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. Tabulations are in Selected Data on Science and Engineering Doctorate Awards; 1990, NSF 91-310, April 1991, pp.10-15.

Table 56. Science and engineering doctorate recipients, by field of doctorate and sex--U.S. citizens: 1980-90

Page 1 of 1

Field of doctorate and sex	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total, science and engineering											
Male	10,072	10,046	9,652	9,457	9,287	9,018	8,783	8,718	8,933	8,750	8,939
Female	3,338	3,498	3,640	3,946	3,963	3,929	4,086	4,102	4,284	4,561	4,679
Sciences, total											
Male	8,881	8,929	8,557	8,377	8,136	7,858	7,542	7,309	7,330	7,135	7,254
Female	3,274	3,445	3,566	3,863	3,875	3,810	3,944	3,953	4,106	4,312	4,437
Physical sciences											
Male	1,654	1,732	1,727	1,779	1,768	1,720	1,682	1,719	1,738	1,572	1,676
Female	230	224	264	285	303	323	332	361	362	401	401
Mathematics											
Male	447	402	386	335	333	306	297	280	283	300	288
Female	73	80	72	76	74	70	69	65	59	93	81
Computer sciences											
Male	137	148	126	153	153	165	165	193	245	266	264
Female	19	20	17	27	25	24	37	50	39	72	79
Earth, atmospheric, and oceanographic sciences											
Male	456	425	436	402	378	354	344	342	395	414	402
Female	56	47	92	81	96	88	78	83	116	115	119
Agricultural and biological sciences											
Male	2,871	2,859	2,851	2,688	2,773	2,679	2,512	2,372	2,380	2,378	2,376
Female	978	1,032	1,113	1,171	1,137	1,152	1,191	1,194	1,290	1,346	1,350
Psychology											
Male	1,637	1,746	1,556	1,576	1,440	1,396	1,330	1,259	1,190	1,146	1,145
Female	1,222	1,365	1,320	1,468	1,495	1,409	1,436	1,488	1,477	1,538	1,645
Social sciences											
Male	1,679	1,617	1,475	1,444	1,291	1,238	1,212	1,144	1,099	1,059	1,103
Female	696	677	688	755	745	744	801	712	763	747	762
Engineering, total											
Male	1,191	1,117	1,095	1,080	1,151	1,160	1,241	1,409	1,603	1,615	1,685
Female	64	53	74	83	88	119	142	149	178	249	242

NOTE: For a list of subfields included in general field categories, see table 1, pp. 7-9 of source below.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. These data are from Selected Data on Science and Engineering Doctorate Awards: 1990, NSF 91-310, April 1991, pp. 18-19.

Table 57. Science and engineering doctorate recipients, by field of doctorate and sex--
non-U.S. citizens, permanent residents: 1980-90

Page 1 of 1

Field of doctorate and sex	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total, science and engineering											
Male	762	721	692	716	671	744	783	828	873	848	880
Female	190	172	162	182	164	185	204	258	256	273	278
Sciences, total											
Male	473	435	410	405	410	446	460	498	524	509	532
Female	180	157	148	174	151	168	184	233	238	247	250
Physical sciences											
Male	110	119	99	99	97	112	94	110	96	111	119
Female	41	28	20	21	22	23	39	37	40	35	48
Mathematics											
Male	49	37	33	36	24	30	32	39	33	27	36
Female	13	6	8	10	12	12	4	12	11	8	11
Computer sciences											
Male	12	16	12	24	15	24	41	28	35	46	43
Female	1	4	--	3	2	--	6	4	7	12	10
Earth, atmospheric, and oceanographic sciences											
Male	22	15	25	23	24	28	21	18	27	24	23
Female	4	1	4	7	1	4	3	7	4	6	--
Agricultural and biological sciences											
Male	131	104	90	94	95	99	117	131	173	133	153
Female	55	55	50	56	54	52	48	77	90	94	88
Psychology											
Male	30	21	23	29	26	29	32	18	27	28	24
Female	20	26	24	35	25	30	33	41	34	26	45
Social sciences											
Male	119	123	128	100	129	124	123	154	133	140	134
Female	46	37	42	42	35	47	51	55	52	66	48
Engineering, total											
Male	289	286	282	311	261	298	323	330	349	339	348
Female	10	15	14	8	13	17	20	25	18	26	28

Double dashes (--) indicate that no doctorates were reported.

NOTE: For a list of subfields included in general field categories, see table 1, pp. 7-9 of source below.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. These data are from Selected Data on Science and Engineering Doctorate Awards: 1990, NSF 91-310, April 1991, pp. 21-22.

Table 58. Science and engineering doctorate recipients, by field of doctorate and sex--non-U.S. citizens, temporary residents: 1980-90

Page 1 of 1

Field of doctorate and sex	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total, science and engineering											
Male	2,450	2,640	2,808	3,058	3,279	3,527	3,604	3,888	4,242	4,598	5,339
Female	260	322	319	342	413	501	537	562	678	780	947
Sciences, total											
Male	1,614	1,727	1,809	1,914	2,053	2,164	2,281	2,410	2,590	2,747	3,265
Female	245	293	288	316	370	445	488	508	608	690	830
Physical sciences											
Male	380	392	442	480	501	525	644	703	738	742	849
Female	46	50	64	59	63	95	114	95	127	146	172
Mathematics											
Male	130	162	179	185	207	216	234	260	262	299	354
Female	9	24	13	24	25	22	38	42	43	47	59
Computer sciences											
Male	42	38	56	66	81	81	119	138	168	160	249
Female	1	2	3	6	8	8	4	5	8	18	14
Earth, atmospheric, and oceanographic sciences											
Male	76	78	76	99	97	106	93	112	124	110	152
Female	4	7	5	7	9	13	13	13	13	14	19
Agricultural and biological sciences											
Male	508	512	503	520	550	608	558	581	680	700	902
Female	84	101	100	109	125	171	153	200	222	264	343
Psychology											
Male	48	48	42	48	53	53	47	48	48	60	61
Female	23	32	23	31	35	28	34	37	36	46	55
Social sciences											
Male	430	497	511	516	564	575	586	568	570	676	698
Female	78	77	80	80	105	108	132	116	159	155	168
Engineering, total											
Male	836	913	999	1,144	1,226	1,363	1,323	1,478	1,652	1,851	2,074
Female	15	29	31	26	43	56	49	54	70	90	117

NOTE: See NSF, Selected Data on Science and Engineering Doctorate Awards: 1990, NSF 91-310, April 1991, table 1, pp 7-9, for a list of fields included in general field categories.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. These data are from unpublished tabulations.

Table 59. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group--total: 1980-90

Page 1 of 2

Field of doctorate and racial/ethnic group	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total, science and engineering											
White	13,072	13,392	13,382	13,634	13,340	13,149	13,179	13,105	13,603	13,761	14,188
Black	510	552	547	536	600	579	514	489	539	532	533
Asian	2,118	2,191	2,332	2,475	2,738	2,943	3,016	3,388	3,825	4,237	5,028
Native American	27	26	38	28	31	41	53	53	41	52	40
Hispanic	479	568	503	546	550	575	635	648	691	693	746
Other/unknown	1,317	1,267	1,215	1,174	1,255	1,425	1,854	2,024	2,042	2,255	2,138
Sciences, total											
White	11,644	11,992	11,947	12,128	11,832	11,600	11,469	11,270	11,535	11,540	11,827
Black	453	493	492	469	532	507	465	433	472	474	459
Asian	1,378	1,388	1,497	1,572	1,709	1,786	1,912	2,099	2,362	2,610	3,226
Native American	24	22	35	27	28	40	47	45	37	45	36
Hispanic	402	472	412	446	469	489	540	550	566	575	622
Other/unknown	1,143	1,101	988	970	1,031	1,124	1,442	1,598	1,579	1,742	1,611
Physical sciences											
White	1,776	1,859	1,993	2,080	2,018	2,054	2,033	2,130	2,110	1,989	2,094
Black	31	36	45	42	56	46	45	37	51	44	33
Asian	425	442	448	449	513	522	625	652	735	800	936
Native American	3	1	3	6	4	3	5	7	6	10	3
Hispanic	51	61	50	62	84	75	89	96	98	88	103
Other/unknown	235	228	155	163	170	216	293	290	317	313	325
Mathematics											
White	555	519	523	486	469	447	444	421	439	490	486
Black	14	18	12	5	8	11	12	18	8	13	13
Asian	108	126	110	124	142	141	157	172	186	211	273
Native American	--	1	1	--	3	--	1	--	2	--	1
Hispanic	16	25	24	26	38	31	39	34	28	30	29
Other/unknown	51	39	50	60	38	58	76	95	86	115	90
Computer sciences											
White	166	186	162	207	193	208	233	270	309	362	392
Black	--	3	1	4	6	3	4	3	4	4	2
Asian	23	28	43	55	73	66	105	113	158	173	238
Native American	--	--	1	1	--	--	--	3	1	2	--
Hispanic	4	2	4	6	5	8	12	10	8	10	13
Other/unknown	25	13	9	13	18	25	45	51	35	61	59
Earth, atmospheric, and oceanographic sciences											
White	516	492	541	488	500	475	455	449	542	553	553
Black	5	12	10	12	9	6	4	3	7	7	5
Asian	49	35	65	72	64	78	65	76	85	80	118
Native American	2	--	--	2	--	1	2	--	2	6	1
Hispanic	20	12	15	22	13	14	7	22	20	23	21
Other/unknown	36	32	26	41	28	43	56	78	72	71	71
Agricultural and biological sciences											
White	3,696	3,738	3,875	3,808	3,839	3,785	3,637	3,508	3,706	3,711	3,761
Black	127	144	121	121	143	142	129	119	132	128	122
Asian	410	411	431	461	474	521	511	589	661	726	974
Native American	6	7	10	5	11	17	18	13	12	9	7
Hispanic	140	176	137	130	120	172	162	177	207	202	215
Other/unknown	336	310	270	231	290	267	348	410	409	427	430

See explanatory information and SOURCE at end of table.

Table 59. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group--
total: 1980-90

Page 2 of 2

Field of doctorate and racial/ethnic group	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Psychology											
White	2,613	2,899	2,687	2,834	2,735	2,637	2,591	2,569	2,483	2,516	2,604
Black	121	116	120	113	123	108	112	97	109	101	116
Asian	62	56	43	73	68	63	61	63	74	90	99
Native American	6	9	16	9	6	10	9	16	7	11	18
Hispanic	61	74	77	103	97	73	100	104	98	102	112
Other/unknown	235	204	216	215	228	226	251	320	293	383	318
Social sciences											
White	2,322	2,299	2,166	2,225	2,078	1,994	2,076	1,923	1,946	1,919	1,937
Black	155	164	183	172	187	191	159	156	161	177	168
Asian	301	290	357	338	375	395	388	434	463	530	588
Native American	7	4	4	4	4	9	12	6	7	7	6
Hispanic	110	122	105	97	112	116	131	107	107	120	129
Other/unknown	225	275	262	247	259	289	373	354	367	372	318
Engineering, total											
White	1,428	1,400	1,435	1,506	1,508	1,549	1,710	1,835	2,068	2,221	2,361
Black	57	59	55	67	68	72	49	56	67	58	74
Asian	740	803	835	903	1,029	1,157	1,104	1,289	1,463	1,627	1,802
Native American	3	4	3	1	3	1	6	8	4	7	4
Hispanic	77	96	91	100	81	86	95	98	125	118	124
Other/unknown	174	166	227	204	224	301	412	426	463	513	527

Double dashes (--) indicate that no doctorates were reported.

NOTE: (1) These data are for all doctorate recipients, including those whose citizenship is unknown.
(2) See NSF, Selected Data on Science and Engineering Doctorate Awards: 1990, NSF 91-310, table 1, pp. 7-9, for a list of subfields included in general field categories.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. These data are from unpublished tabulations.

Table 60. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group--
U.S. citizens: 1980-90

Page 1 of 2

Field of doctorate and racial/ethnic group	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total, science and and engineering											
White	11,844	12,090	12,034	12,116	11,921	11,660	11,616	11,483	11,876	11,914	12,260
Black	276	282	285	283	299	278	254	234	260	284	264
Asian	325	330	327	345	384	373	397	443	451	487	467
Native American	27	26	38	27	31	41	52	52	41	52	40
Hispanic	171	198	226	237	254	244	276	305	327	310	376
Other/unknown	767	618	382	395	361	351	274	303	262	264	211
Sciences, total											
White	10,776	11,081	11,019	11,100	10,859	10,563	10,387	10,152	10,346	10,331	10,591
Black	265	266	276	264	287	259	240	222	241	260	236
Asian	252	253	255	279	289	283	317	308	310	314	315
Native American	24	22	35	27	28	40	46	45	37	45	36
Hispanic	153	186	203	219	232	228	251	281	284	276	337
Other/unknown	685	566	335	351	316	295	245	254	218	221	176
Physical sciences											
White	1,632	1,724	1,827	1,879	1,854	1,850	1,817	1,888	1,881	1,766	1,863
Black	13	19	21	19	28	23	20	16	28	25	16
Asian	54	46	56	66	77	76	75	67	67	75	85
Native American	3	1	3	6	4	3	5	7	6	10	3
Hispanic	20	26	21	24	38	26	35	48	57	52	61
Other/unknown	162	140	63	70	70	65	62	54	61	45	49
Mathematics											
White	469	429	419	374	366	337	326	295	308	351	341
Black	11	7	6	3	3	3	5	10	2	6	4
Asian	12	20	11	13	9	14	14	18	17	13	9
Native American	--	1	1	--	3	--	1	--	2	--	1
Hispanic	3	4	6	4	11	7	9	9	3	8	7
Other/unknown	25	21	15	17	15	15	11	13	10	15	7
Computer sciences											
White	138	154	134	161	155	170	176	215	253	296	320
Black	--	2	1	3	2	2	--	2	1	1	1
Asian	2	4	2	6	12	2	12	10	20	18	10
Native American	--	--	1	1	--	--	--	3	1	2	--
Hispanic	1	--	1	--	3	5	4	4	2	4	4
Other/unknown	15	8	4	9	6	10	10	9	7	17	8
Earth, atmospheric, and oceanographic sciences											
White	476	443	498	443	449	415	398	395	480	495	494
Black	1	3	2	1	2	2	--	1	2	3	2
Asian	7	4	12	8	8	8	6	9	8	11	4
Native American	2	--	--	2	--	1	2	--	2	6	1
Hispanic	3	6	6	9	1	4	5	3	8	6	11
Other/unknown	23	16	10	20	14	12	11	17	11	8	9
Agricultural and biological sciences											
White	3,450	3,515	3,632	3,560	3,590	3,515	3,383	3,238	3,371	3,393	3,420
Black	49	52	48	49	55	49	47	52	44	51	37
Asian	93	98	104	116	110	114	136	123	110	127	122
Native American	6	7	10	5	11	17	17	13	12	9	7
Hispanic	30	42	50	41	43	59	59	64	74	71	86
Other/unknown	221	177	120	88	101	77	61	76	59	73	54

See explanatory information and SOURCE at end of table.

Table 60. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group--
U.S. citizens: 1980-90

Page 2 of 2

Field of doctorate and racial/ethnic group	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Psychology											
White	2,533	2,819	2,607	2,740	2,652	2,552	2,509	2,476	2,404	2,423	2,505
Black	115	111	112	110	115	101	102	88	99	96	107
Asian	40	33	25	35	32	34	32	38	37	38	42
Native American	6	9	16	9	6	10	9	16	7	11	18
Hispanic	51	59	69	84	81	64	81	92	89	87	94
Other/unknown	114	80	47	66	49	44	33	37	31	29	24
Social sciences											
White	2,078	1,997	1,902	1,943	1,793	1,724	1,778	1,645	1,649	1,607	1,648
Black	76	72	86	79	82	79	66	53	65	78	69
Asian	44	48	45	35	41	35	42	43	51	32	43
Native American	7	4	4	4	4	9	12	6	7	7	6
Hispanic	45	49	50	57	55	63	58	61	51	48	74
Other/unknown	125	124	76	81	61	72	57	48	39	34	25
Engineering, total											
White	1,068	1,009	1,015	1,016	1,062	1,097	1,229	1,331	1,530	1,583	1,669
Black	11	16	9	19	12	19	14	12	19	24	28
Asian	73	77	72	66	95	90	80	135	141	173	152
Native American	3	4	3	--	3	1	6	7	4	7	4
Hispanic	18	12	23	18	22	16	25	24	43	34	39
Other/unknown	82	52	47	44	45	56	29	49	44	43	35

Double dashes (--) indicate that no doctorates were reported.

NOTE: For a list of subfields included in general field categories, see table 1, pp 7-9 of source below.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. These data are from Selected Data on Science and Engineering Doctorate Awards: 1990, NSF 91-310, April 1991, p. 17.

Table 61. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group--non-U.S. citizens, permanent residents: 1980-90

Page 1 of 2

Field of doctorate and racial/ethnic group	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total, science and engineering											
White	302	298	296	362	325	344	398	438	450	450	467
Black	43	50	51	39	58	79	64	74	86	68	76
Asian	541	491	438	433	390	435	410	478	462	492	501
Native American	--	--	--	1	--	--	--	--	--	--	--
Hispanic	42	40	43	45	41	46	66	49	67	66	75
Other/unknown	24	14	26	18	21	25	49	47	64	42	39
Sciences, total											
White	227	214	211	250	230	253	273	311	326	307	318
Black	36	47	40	29	55	64	54	61	74	59	64
Asian	336	283	264	252	235	244	228	286	270	305	308
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	33	36	30	34	29	40	56	39	47	52	61
Other/unknown	21	12	13	14	12	13	33	34	45	30	31
Physical sciences	151	147	119	120	119	135	133	147	136	146	167
White	29	33	32	38	34	50	41	54	46	51	66
Black	3	5	5	6	6	4	5	4	5	6	11
Asian	110	103	75	70	67	74	71	76	70	80	76
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	7	4	4	2	9	4	5	8	6	7	9
Other/unknown	2	2	3	4	3	3	11	5	9	2	5
Mathematics											
White	27	19	18	21	14	13	17	24	24	18	26
Black	1	2	--	--	1	4	1	1	2	2	--
Asian	30	20	21	21	21	19	14	23	16	11	16
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	2	1	--	3	--	5	3	2	1	3	3
Other/unknown	2	1	2	1	--	1	1	1	1	1	2
Computer sciences											
White	5	8	2	13	8	7	17	14	12	23	14
Black	--	--	--	--	1	1	1	--	1	--	--
Asian	7	12	10	14	8	15	25	16	24	34	36
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	--	--	--	--	--	1	3	--	--	--	1
Other/unknown	1	--	--	--	--	--	1	2	5	1	2
Earth, atmospheric, and oceanographic sciences											
White	9	5	12	10	12	15	15	13	20	14	8
Black	--	1	1	--	1	2	1	1	1	1	--
Asian	15	10	15	18	11	13	8	9	7	12	13
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	1	--	1	2	1	2	--	2	--	3	2
Other/unknown	1	--	--	--	--	--	--	--	3	--	--
Agricultural and biological sciences											
White	61	51	46	48	56	57	62	75	113	82	85
Black	9	9	8	9	13	20	17	21	24	19	19
Asian	105	83	78	81	68	61	53	85	91	95	101
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	6	14	4	8	9	12	24	13	23	19	25
Other/unknown	5	2	4	4	3	1	9	14	12	12	11

See explanatory information and SOURCE at end of table.

Table 61. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group--non-U.S. citizens, permanent residents: 1980-90

Page 2 of 2

Field of doctorate and racial/ethnic group	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Psychology											
White	29	30	31	43	31	38	38	40	41	30	46
Black	4	2	3	2	6	4	7	5	4	1	3
Asian	10	8	6	9	11	10	9	9	10	17	9
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	3	7	5	10	3	5	8	3	4	6	9
Other/unknown	4	--	2	--	--	2	3	2	2	--	2
Social sciences											
White	67	68	70	77	75	73	83	91	70	89	73
Black	19	28	23	12	27	29	22	29	37	30	31
Asian	59	47	59	39	49	52	48	68	52	56	57
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	14	10	16	9	7	11	13	11	13	17	12
Other/unknown	6	7	2	5	6	6	8	10	13	14	9
Engineering, total											
White	75	84	85	112	95	91	125	127	124	143	149
Black	7	3	11	10	3	15	10	13	12	9	12
Asian	205	208	174	181	155	191	182	192	192	187	193
Native American	--	--	--	1	--	--	--	--	--	--	--
Hispanic	9	4	13	11	12	6	10	10	20	14	14
Other/unknown	3	2	13	4	9	12	16	13	19	12	8

Double dashes (--_ indicate that no doctorates were reported.

NOTE: For a list of subfields included in general field categories, see table 1, pp 7-9 of source below.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. These data are from Selected Data on Science and Engineering Doctorate Awards: 1990, NSF 91-310, April 1991, p. 20.

Table 62. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group--non-U.S. citizens, temporary residents: 1980-90

Page 1 of 2

Field of doctorate and racial/ethnic group	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total, science and and engineering											
White	918	994	1,014	1,128	1,073	1,139	1,139	1,171	1,267	1,380	1,445
Black	186	213	207	211	235	221	195	180	190	170	188
Asian	1,216	1,308	1,505	1,627	1,896	2,096	2,191	2,451	2,888	3,245	4,034
Native American	-	-	-	-	-	-	1	1	-	-	-
Hispanic	260	319	226	256	248	284	290	289	292	311	290
Other/unknown	130	128	175	178	240	288	325	358	283	272	329
Sciences, total											
White	634	690	686	753	726	778	791	796	856	889	907
Black	147	174	174	173	184	183	170	149	154	147	155
Asian	768	815	940	999	1,147	1,245	1,353	1,493	1,763	1,980	2,587
Native American	-	-	-	-	-	-	1	-	-	-	-
Hispanic	211	243	174	185	202	220	230	226	231	241	219
Other/unknown	99	98	123	120	164	183	224	254	194	180	227
Physical sciences											
White	115	101	132	160	125	153	170	186	183	171	163
Black	14	12	18	16	22	19	19	17	17	13	6
Asian	255	276	310	306	356	369	476	505	591	641	772
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	21	30	24	34	35	45	48	39	34	28	32
Other/unknown	21	23	22	23	26	34	45	51	40	35	48
Mathematics											
White	58	71	84	90	88	97	101	102	107	121	119
Black	2	9	6	2	4	4	6	7	4	5	9
Asian	65	81	76	88	107	107	125	131	150	187	248
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	11	19	17	19	27	19	26	23	24	19	18
Other/unknown	3	6	9	10	6	11	14	39	20	14	19
Computer sciences											
White	23	23	26	33	30	31	39	40	44	42	55
Black	--	1	--	1	3	--	3	1	2	3	1
Asian	14	12	30	31	51	49	68	86	114	120	190
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	3	2	3	6	2	2	5	6	5	6	8
Other/unknown	3	2	--	1	3	7	8	10	11	7	9
Earth, atmospheric, and oceanographic sciences											
White	31	43	31	34	39	45	42	40	41	44	51
Black	4	8	7	11	6	2	3	1	4	3	3
Asian	26	21	34	44	45	57	50	57	70	57	101
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	16	6	8	11	11	8	2	17	12	14	8
Other/unknown	3	7	1	6	5	7	9	10	10	6	8
Agricultural and biological sciences											
White	182	171	185	191	189	210	188	191	220	234	256
Black	68	79	65	61	72	73	65	45	63	57	63
Asian	209	221	238	256	287	343	318	378	454	501	744
Native American	--	--	--	--	--	--	1	--	--	--	--
Hispanic	104	117	82	80	67	101	78	97	109	111	103
Other/unknown	29	25	33	41	60	52	61	70	56	61	79

See explanatory information and SOURCE at end of table.

Table 62. Science and engineering doctorate recipients, by field of doctorate and racial/ethnic group--non-U.S. citizens, temporary residents: 1980-90

Page 2 of 2

Field of doctorate and racial/ethnic group	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Psychology											
White	50	48	42	43	49	47	42	51	37	56	52
Black	2	3	5	1	1	3	3	4	6	4	6
Asian	9	15	9	28	24	19	20	15	27	35	48
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	6	7	3	7	12	4	11	9	5	9	9
Other/unknown	4	7	6	--	2	8	5	6	9	2	2
Social sciences											
White	175	233	186	202	206	195	209	186	224	221	211
Black	57	62	73	81	76	82	71	74	58	62	67
Asian	190	189	243	246	277	301	296	321	357	439	484
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	50	62	37	28	48	41	60	35	42	54	42
Other/unknown	36	28	52	39	62	64	82	68	48	55	62
Engineering, total											
White	284	304	328	375	347	361	348	375	411	491	538
Black	39	39	33	38	51	38	25	31	36	23	33
Asian	448	493	565	628	749	851	838	958	1,125	1,265	1,447
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic	49	76	52	71	46	64	60	63	61	70	71
Other/unknown	31	30	52	58	76	105	101	104	89	92	102

Double dashes (--) indicate that no doctorates were reported.

NOTE: For a list of subfields included in general field categories, see source below.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Earned Doctorates. These data are from Science and Engineering Doctorates: 1960-90, NSF 91-30, table 3, pp. 132-146.

Table 63. Primary source of support for U.S. citizen doctorate holders in science and engineering fields, by sex and race/ethnicity: 1990

Page 1 of 2

Primary source of support	Total	Male	Female	White	Black	Asian	Native American	Hispanic (1)
Total, science and engineering								
Personal	3,856	2,214	1,642	3,554	75	76	15	92
University	6,467	4,559	1,908	5,900	85	238	10	140
Federal	1,132	720	412	994	25	42	5	49
Other	438	330	108	371	17	26	3	14
Unknown	1,725	1,116	609	1,441	62	85	7	81
Sciences, total								
Personal	3,486	1,880	1,606	3,225	73	56	12	83
University	5,445	3,679	1,766	4,992	76	162	9	127
Federal	970	579	391	849	24	37	5	41
Other	275	187	88	236	10	10	3	11
Unknown	1,515	929	586	1,289	53	50	7	75
Physical sciences								
Personal	232	188	44	213	2	4	--	8
University	1,457	1,187	270	1,317	10	64	3	36
Federal	107	81	26	92	--	6	--	8
Other	46	39	7	39	--	3	--	2
Unknown	235	181	54	202	4	8	--	7
Mathematics								
Personal	60	43	17	59	--	--	--	1
University	235	191	44	220	3	7	--	--
Federal	16	13	3	14	--	--	--	2
Other	9	8	1	9	--	--	--	--
Unknown	49	33	16	39	1	2	1	4
Computer sciences								
Personal	108	73	35	102	1	4	--	--
University	164	134	30	152	--	5	--	1
Federal	16	13	3	16	--	--	--	--
Other	39	32	75	37	--	--	--	2
Unknown	16	12	4	13	--	1	--	1
Earth, atmospheric, and oceanographic sciences								
Personal	112	96	16	110	--	--	--	1
University	305	227	78	291	1	2	--	7
Federal	29	20	9	27	1	--	--	--
Other	8	7	9	7	--	--	1	--
Unknown	67	52	15	59	--	2	--	3
Agricultural and biological sciences								
Personal	700	441	259	659	6	17	1	11
University	1,836	1,199	637	1,705	11	54	4	38
Federal	624	353	271	559	11	26	2	15
Other	83	57	26	75	2	2	--	3
Unknown	483	326	157	422	7	23	--	19
Psychology								
Personal	1,554	615	939	1,440	42	13	9	37
University	733	310	423	657	30	18	--	23
Federal	94	44	50	66	10	3	2	12
Other	31	11	20	23	2	3	2	1
Unknown	378	165	213	319	23	5	5	21

See explanatory information and SOURCE at end of table.

Table 63. Primary source of support for U.S. citizen doctorate holders in science and engineering fields, by sex and race/ethnicity: 1990

Page 2 of 2

Primary source of support	Total U.S	Male	Female	White	Black	Asian	Native American	Hispanic (1)
Social sciences								
Personal	720	424	296	642	22	18	2	25
University	715	431	284	650	21	12	2	22
Federal	84	55	29	75	2	2	1	4
Other	59	99	26	46	6	2	--	3
Unknown	287	160	127	235	18	9	1	20
Engineering, total								
Personal	370	334	36	329	2	20	3	9
University	1,022	880	142	908	9	76	1	13
Federal	162	141	21	145	1	5	--	8
Other	163	143	20	135	7	16	--	3
Unknown	210	187	23	152	9	35	--	6

Double dashes (--) indicate that no doctorates were reported.

(1) Hispanics are counted separately in doctorate degree data.

NOTE: "Personal" includes loans as well as own earnings and contributions from spouse or family. Federally funded research assistantships (RAs) are grouped under "University" because recipients of such support may not be aware of the actual source of funding. It is believed that many of these recipients are reporting their support as university RA instead of Federal RA. "Other" support includes U.S. nationally competitive fellowships, business or employer funds, foreign government funds, and other nonspecified sources.

SOURCE: National Research Council, Office of Scientific and Engineering Personnel, Survey of Earned Doctorates. Figures are from unpublished tabulations and from Delores H. Thurgood and Joanne Weinman, Summary Report 1990: Doctorate Recipients from United States Universities, (Washington, DC: National Academy Press, 1991).

Table 64. National Science Foundation fellowships in science and engineering, by field and sex: fiscal year 1975

Page 1 of 1

Field	Number of applicants			Number of awards offered									Honorable mention		
				Total			New			Continuation (1)					
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total, sciences and engineering	5,773	3,995	1,778	1,527	1,137	390	550	404	146	977	733	244	2,078	1,544	534
Engineering, mathematics, and physical sciences	2,480	2,081	399	679	614	65	239	213	26	440	401	39	888	807	81
Applied mathematics	381	284	97	97	82	15	36	29	7	61	53	8	127	112	15
Astronomy	52	46	6	12	12	0	7	7	0	5	5	0	21	19	2
Chemistry	429	337	92	115	101	14	40	34	6	75	67	8	132	113	19
Earth sciences	280	204	76	80	65	15	33	28	5	47	37	10	81	59	22
Engineering	684	642	42	188	176	12	63	58	5	125	118	7	273	264	9
Mathematics	263	192	71	86	82	4	24	22	2	62	60	2	87	79	8
Physics	391	376	15	101	96	5	36	35	1	65	61	4	167	161	6
Life and medical sciences	1,704	1,000	704	408	241	167	163	90	73	245	151	94	539	349	190
Biochemistry, biophysics, and molecular biology	395	268	127	89	60	29	35	24	11	54	36	18	128	96	32
Biological sciences	815	480	335	218	135	83	77	46	31	141	89	52	266	172	94
Biomedical sciences	494	252	242	101	46	55	51	20	31	50	26	24	145	81	64
Behavioral and social sciences	1,589	914	675	440	282	158	148	101	47	292	181	111	651	388	263
Anthropology and sociology	522	252	270	156	92	64	49	30	19	107	62	45	326	170	156
Psychology	453	247	206	128	80	48	46	33	13	82	47	35	142	85	57
Social sciences	614	415	199	156	110	46	53	38	15	103	72	31	183	133	50

(1) Includes only those on tenure in 1975, excluding reinstatements

SOURCE: National Science Foundation, Division of Research Career Development, Graduate and Minority Graduate Fellowships Program. These data are from Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 49, p. 160.

Table 65. National Science Foundation fellowships in science and engineering, by field and sex: fiscal year 1985

Page 1 of 1

Field	Number of applicants			Number of awards offered											
				Total			New			Continuation			Honorable mention		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total, sciences and engineering	4,390	2,776	1,614	1,419	949	470	540	362	178	879	587	292	1,544	1,079	465
Engineering, mathematics, and physical sciences	2,210	1,681	529	719	584	135	277	233	44	442	341	91	756	613	143
Applied mathematics	355	262	93	112	101	11	45	41	4	67	60	7	169	139	30
Astronomy	30	27	3	10	9	1	3	3	0	7	6	1	5	5	0
Chemistry	337	219	118	114	87	27	41	32	9	73	55	18	95	72	23
Earth sciences	239	151	88	91	53	38	29	20	9	62	33	29	86	50	36
Engineering	778	635	143	254	200	44	97	82	15	157	118	29	292	245	47
Mathematics	148	105	43	48	42	6	20	19	1	28	23	5	44	40	4
Physics	323	282	41	90	82	8	42	36	6	48	46	2	65	62	3
Life and medical sciences	1,347	698	649	431	224	207	163	79	84	268	145	123	455	277	178
Biochemistry, biophysics, and molecular biology	413	246	167	125	80	45	48	32	16	77	48	29	186	119	67
Biological sciences	572	298	274	189	96	93	72	32	40	117	64	53	159	96	63
Biomedical sciences	362	154	208	117	48	69	43	15	28	74	33	41	110	62	48
Behavioral and social sciences	833	397	436	269	141	128	100	50	50	169	91	78	333	189	144
Anthropology and sociology	214	89	125	76	38	38	25	15	10	51	23	28	89	43	46
Psychology	288	108	180	87	32	55	35	10	25	52	22	30	103	45	58
Social sciences	331	200	131	106	71	35	40	25	15	66	46	20	141	101	40

SOURCE: National Science Foundation, Division of Research Career Development, Graduate and Minority Graduate Fellowships Program. These data are from Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 49, p. 161.

Table 66. National Science Foundation fellowships in science and engineering, by field and sex: fiscal year 1990

Page 1 of 1

Field	Number of applicants			Number of awards offered											
				Total			New			Continuation			Honorable mention		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total, sciences and engineering	6,309	3,629	2,680	2,050	1,266	784	851	494	357	1,199	587	427	1,895	1,278	617
Engineering, mathematics, and physical sciences	3,387	2,257	1,130	1,158	832	326	515	330	185	643	502	141	990	776	214
Applied mathematics	151	82	69	57	44	13	22	18	4	35	26	9	37	25	12
Astronomy	51	36	15	15	12	3	8	7	1	7	5	2	25	19	6
Chemistry	386	237	149	146	89	57	49	29	20	97	60	37	117	87	30
Computer sciences	342	254	88	108	83	25	45	34	11	63	49	14	93	82	11
Earth sciences	200	117	83	61	41	20	26	17	9	35	24	11	64	41	23
Engineering	1,602	1,014	588	507	330	177	271	145	126	236	185	51	442	344	98
Mathematics	224	157	67	88	78	10	34	28	6	54	50	4	70	56	14
Physics	431	360	71	176	155	21	60	52	8	116	103	13	142	122	20
Life and medical sciences	1,604	744	860	473	218	255	182	85	97	291	133	158	500	276	224
Biochemistry, biophysics, and molecular biology	517	268	249	166	87	79	63	38	25	103	49	54	177	108	69
Biological sciences	638	288	350	193	90	103	75	28	47	118	62	56	182	94	88
Biomedical sciences	449	188	261	114	41	73	44	19	25	70	22	48	141	74	67
Behavioral and social sciences	1,318	628	690	419	216	203	154	79	75	265	137	128	405	226	179
Anthropology and sociology (1)	431	164	267	127	54	73	47	19	28	80	35	45	111	49	62
Psychology	374	141	233	131	56	75	46	17	29	85	39	46	114	48	66
Social sciences	513	323	190	161	106	55	61	43	18	100	63	37	180	129	51

(1) Includes demography, social studies, linguistics, and archaeology

SOURCE: National Science Foundation, Division of Research Career Development, Graduate and Minority Graduate Fellowships Program. Data for 1990 are from unpublished tabulations.

Table 67. National Science Foundation minority fellowships in science and engineering, by field and sex: fiscal year 1980

Page 1 of 1

Field	Number of applicants	Number of awards offered			Honorable mention
		Total	New	Continuation	
Total, science and engineering	404	127	55	72	130
Engineering, mathematics, and physical sciences	114	39	14	25	38
Applied mathematics	19	5	3	2	7
Astronomy	1	0	0	0	0
Chemistry	16	12	4	8	6
Earth sciences	12	1	0	1	4
Engineering	50	10	5	5	17
Mathematics	6	5	1	4	2
Physics	10	6	1	5	2
Life and medical sciences	115	38	15	23	39
Biochemistry, biophysics, and molecular biology	27	8	4	4	6
Biological sciences	49	15	6	9	18
Biomedical sciences	39	15	5	10	15
Behavioral and social sciences	175	50	26	24	53
Anthropology and sociology	33	10	3	7	14
Psychology	67	20	11	9	16
Social sciences	75	20	12	8	23

SOURCE: National Science Foundation, Division of Research Career Development, Graduate and Minority Graduate Fellowships Program. These data are from Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 50, p. 163.

Table 68. National Science Foundation minority fellowships in science and engineering, by field and sex: fiscal year 1985

Page 1 of 1

Field	Number of applicants	Number of awards offered			Honorable mention
		Total	New	Continuation	
Total, science and engineering	612	159	60	99	196
Engineering, mathematics, and physical sciences	243	54	22	32	91
Applied mathematics	42	10	3	7	13
Astronomy	1	0	0	0	1
Chemistry	36	9	2	7	14
Earth sciences	18	6	2	4	3
Engineering	112	23	11	12	52
Mathematics	17	3	2	1	7
Physics	17	3	2	1	1
Life and medical sciences	159	45	15	30	54
Biochemistry, biophysics, and molecular biology	31	12	4	8	12
Biological sciences	70	22	8	14	21
Biomedical sciences	58	11	3	8	21
Behavioral and social sciences	210	60	23	37	51
Anthropology and sociology	32	15	5	10	8
Psychology	81	20	9	11	20
Social sciences	97	25	9	16	23

SOURCE: National Science Foundation, Division of Research Career Development, Graduate and Minority Graduate Fellowships Program. These data are from Women and Minorities in Science and Engineering, NSF 90-301, January 1990, appendix B, table 50, p. 164.

Table 69. National Science Foundation minority fellowships in science and engineering, by field and sex: fiscal year 1990

Page 1 of 1

Field	Number of applicants			Number of awards offered											
				Total			New			Continuation			Honorable mention		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total, sciences and engineering	869	433	436	301	166	135	150	89	61	151	77	74	253	138	115
Engineering, mathematics, and physical sciences	398	243	155	137	91	46	77	49	28	60	42	18	104	76	28
Applied mathematics	25	14	11	5	4	1	2	2	0	3	2	1	7	7	0
Astronomy	2	2	0	1	1	0	1	1	0	0	0	0	1	1	0
Chemistry	49	24	25	19	11	8	8	6	2	11	5	6	15	7	8
Computer sciences	47	25	22	8	6	2	6	4	2	2	2	0	15	8	7
Earth sciences	18	8	10	7	4	3	2	1	1	5	3	2	8	6	2
Engineering	211	134	77	75	45	30	47	25	22	28	20	8	46	38	8
Mathematics	19	14	5	11	10	1	6	6	0	5	4	1	4	2	2
Physics	27	22	5	11	10	1	5	4	1	6	6	0	8	7	1
Life and medical sciences	209	79	130	73	36	37	32	17	15	41	19	22	62	22	40
Biochemistry, biophysics, and molecular biology	56	23	33	29	15	14	9	5	4	20	10	10	22	11	11
Biological sciences	65	25	40	22	13	9	11	7	4	11	6	5	19	2	17
Biomedical sciences	88	31	57	22	8	14	12	5	7	10	3	7	21	9	12
Behavioral and social sciences	262	111	151	91	39	52	41	23	18	50	16	34	87	40	47
Anthropology and sociology (1)	87	28	59	27	11	16	14	6	8	13	5	8	31	10	21
Psychology	83	29	54	28	6	22	12	6	6	16	0	16	24	9	15
Social sciences	92	54	38	36	22	14	15	11	4	21	11	10	32	21	11

(1) Includes demography, social studies, linguistics, and archaeology

SOURCE: National Science Foundation, Division of Research Career Development, Graduate and Minority Graduate Fellowships Program, unpublished tabulations.

Table 70. Postdoctoral scientists and engineers, by field, sex, and racial/ethnic group: 1977, 1983, 1985, 1987, and 1989

Page 1 of 2

Field (1)	Total (2,3)	Male	Female	White	Black	Asian	Native American	Hispanic
1977								
Total, scientists and engineers	9,755	7,738	2,017	8,175	104	1,354	--	136
Scientists, total	9,353	7,351	2,002	7,934	99	1,211	--	135
Physical	2,577	2,262	315	2,081	--	459	--	29
Mathematical	78	69	--	71	--	--	--	--
Computer	43	43	--	38	--	--	--	--
Environmental	357	324	33	320	--	29	--	--
Life	5,239	3,910	1,329	4,426	74	685	--	67
Psychologists	550	375	175	532	--	--	--	32
Social (4)	509	368	141	466	--	--	--	--
Engineers, total	402	387	--	241	--	143	--	--
1983								
Total, scientists and engineers	10,945	7,886	3,059	9,457	215	1,175	--	270
Scientists, total	10,620	7,588	3,032	9,332	215	975	--	212
Physical	1,951	1,674	277	1,631	69	242	--	30
Mathematical	103	82	21	101	--	--	--	--
Computer	84	62	22	84	--	--	--	--
Environmental	326	278	48	302	--	--	--	--
Life	6,853	4,634	2,219	6,080	52	674	--	138
Psychologists	492	285	207	450	26	12	--	26
Social (4)	811	573	238	684	68	28	--	--
Engineers, total	325	298	27	125	--	200	--	58
1985								
Total, scientists and engineers	11,796	8,406	3,390	9,862	213	1,629	51	249
Scientists, total	11,398	8,031	3,367	9,723	213	1,370	51	247
Physical	2,303	1,968	335	1,723	94	484	--	55
Mathematical	117	109	--	113	--	--	--	--
Computer	--	--	--	--	--	--	--	--
Environmental	373	331	42	334	--	35	--	24
Life	7,410	4,939	2,471	6,485	92	788	--	129
Psychologists	774	387	387	739	--	--	--	31
Social (4)	408	286	122	316	--	46	29	--
Engineers, total	398	375	23	139	--	259	--	--

See explanatory information and SOURCE at end of table.

Table 70. Postdoctoral scientists and engineers, by field, sex, and racial/ethnic group: 1977, 1983, 1985, 1987, and 1989

Page 2 of 2

Field (1)	Total (2,3)	Male	Female	White	Black	Asian	Native American	Hispanic
1987								
Total, scientists and engineers	12,296	8,737	3,559	10,112	233	1,853	24	283
Scientists, total	11,677	8,147	3,530	9,769	220	1,598	24	260
Physical	2,533	2,143	390	1,831	44	650	--	56
Mathematical	286	259	27	222	--	60	--	--
Computer	143	138	--	140	--	--	--	--
Environmental	427	354	73	380	--	46	--	--
Life	7,263	4,693	2,570	6,266	119	808	--	167
Psychologists	664	334	330	626	--	22	--	24
Social (4)	361	226	135	304	37	--	--	--
Engineers, total	619	590	29	343	--	255	--	23
1989								
Total, scientists and engineers	14,760	10,518	4,242	12,046	214	2,352	34	469
Scientists, total	14,109	9,924	4,185	11,756	188	2,025	34	459
Physical	3,008	2,530	478	2,286	40	645	--	115
Mathematical	344	328	16	247	--	91	--	40
Computer	67	45	22	48	--	--	--	--
Environmental	495	431	64	421	--	71	--	32
Life	8,798	5,829	2,969	7,440	128	1,147	22	245
Psychologists	894	361	533	855	--	32	--	--
Social (4)	503	400	103	459	--	20	--	--
Engineers, total	651	594	57	290	26	327	--	--

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes," p. 69, for a list of fields included in general field categories. Field represents the specialty most closely related to the respondent's postdoctoral appointment. Individuals who did not report a S&E appointment were assigned the specialty of their doctorate.

(2) Includes all doctorate holders with postdoctoral appointments, regardless of citizenship status (i.e., U.S. citizen; non U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa)

(3) Racial/ethnic details will not sum to total because

(a) racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups) and

(b) total employed includes "other" and "no report" categories.

(4) Includes agricultural economics

SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Doctorate Recipients, unpublished tabulations, table S-15

Table 71. Recipients of bachelor's and master's degrees in engineering, by field of engineering, sex, and race/ethnicity: 1989-90

Page 1 of 1

Field of engineering	Total	Male	Female	Black	Asian	Native American	Hispanic
	Bachelor's recipients						
Degrees, total	65,967	55,837	10,130	2,173	5,989	112	2,473
Aerospace	2,971	2,655	316	48	201	0	80
Agricultural	317	268	49	4	3	1	9
Architectural	375	306	69	22	14	0	7
Bioengineering	695	488	207	15	102	0	18
Ceramics	348	273	75	8	15	0	8
Chemical	3,622	2,569	1,053	140	221	6	163
Civil	7,587	6,486	1,101	182	388	15	279
Computer	4,355	3,576	779	122	606	5	162
Electrical/electronic	21,385	18,785	2,600	882	2,920	41	830
Engineering science	1,045	844	201	18	80	2	21
Environmental	137	81	56	0	2	2	4
Industrial (1)	4,306	3,099	1,207	192	244	4	242
Marine	475	448	27	3	10	0	9
Materials/metallurgy	857	643	214	16	56	1	20
Mechanical	14,969	13,237	1,732	452	938	30	531
Mining (2)	168	141	27	0	3	0	3
Nuclear	264	230	34	6	10	0	9
Petroleum/natural gas	286	266	20	5	7	1	7
Systems	362	262	100	13	46	0	9
Other (3)	1,443	1,180	263	45	123	4	62
	Master's recipients (4)						
Degrees, total	27,034	23,168	3,866	424	2,226	38	515
Aerospace	1,016	930	86	10	68	0	15
Agricultural	189	165	24	4	1	0	8
Architectural	33	33	0	1	1	0	0
Bioengineering	310	208	102	5	19	2	5
Ceramics	80	64	16	0	2	1	1
Chemical	1,140	955	185	24	59	2	29
Civil	2,940	2,524	416	47	167	8	59
Computer	3,265	2,567	698	40	334	1	44
Electrical/electronic	7,691	6,848	843	122	868	13	158
Engineering science	701	577	124	12	63	2	10
Environmental	471	351	120	10	34	1	10
Industrial (1)	2,489	2,073	416	52	172	1	65
Marine	146	133	13	3	2	0	2
Materials/metallurgy	671	552	119	6	43	0	9
Mechanical	3,994	3,653	341	48	277	6	57
Mining (2)	192	172	20	1	1	0	2
Nuclear	236	211	25	3	8	1	5
Petroleum/natural gas	162	153	9	2	9	0	6
Systems	692	506	186	26	45	0	16
Other (3)	616	493	123	8	53	0	14

(1) Includes manufacturing engineering and engineering management
(2) Includes mineral and geological engineering
(3) Includes general engineering and all other fields not listed
(4) Includes professional engineering degrees

NOTE: Population categories are neither exhaustive nor mutually exclusive, and will not sum to totals.

SOURCE: Engineering Manpower Commission (of the American Association of Engineering Societies), Engineering and Technology Degrees 1990: Part II--by Minorities, p. 3.

Table 72. Median annual salaries of doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989

Page 1 of 2

Field (1) and racial/ethnic group	Total employed (2,3)	Years of professional experience									
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 and over
Total, scientists and engineers											
White	$54,800	38,400	40,800	46,700	52,600	59,800	63,100	67,200	69,200	75,100	70,100
Black	48,500	36,400	37,300	48,300	51,100	57,300	60,600	--	--	--	--
Asian	55,000	40,700	44,000	51,200	56,300	60,100	64,500	65,400	75,100	--	--
Native American	50,100	--	--	--	--	--	--	--	--	--	--
Hispanic (4)	50,000	36,700	37,200	45,700	54,900	61,000	68,900	--	--	--	--
Scientists, total											
White	52,400	36,400	39,000	45,300	50,900	56,600	61,100	65,000	67,600	73,400	69,300
Black	47,200	36,000	36,800	45,800	50,000	55,300	60,600	--	--	--	--
Asian	51,700	36,800	39,700	47,200	52,900	59,000	60,900	60,700	70,700	--	--
Native American	48,700	--	37,500	48,300	--	--	--	--	--	--	--
Hispanic (4)	48,300	35,500	36,400	44,200	52,300	60,700	69,100	--	--	--	--
Physical scientists											
White	56,700	41,800	45,100	48,600	56,100	60,300	62,300	66,600	67,600	70,800	60,800
Black	50,100	--	28,800	48,300	53,500	51,700	--	--	--	--	--
Asian	52,500	37,200	41,000	50,700	54,800	60,900	64,200	--	--	--	--
Native American	51,300	--	--	--	--	--	--	--	--	--	--
Hispanic (4)	54,300	--	36,800	45,400	52,000	63,100	--	--	--	--	--
Mathematical scientists											
White	51,900	34,300	36,500	42,400	50,200	53,400	60,200	61,800	73,000	79,100	--
Black	44,500	--	--	--	--	--	--	--	--	--	--
Asian	47,900	--	38,600	46,000	50,700	54,700		--	--	--	--
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic (4)	44,000	--	--	--	--	--	--	--	--	--	--
Computer specialists											
White	58,300	50,900	53,500	52,700	57,400	62,900	60,300	75,700	74,700	--	--
Black	--	--	--	--	--	--	--	--	--	--	--
Asian	60,100	--	54,100	60,500	60,100	73,200	--	--	--	--	--
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic (4)	56,900	--	--	--	--	--	--	--	--	--	--
Environmental scientists											
White	54,800	34,300	38,200	45,700	55,100	60,700	62,600	70,700	72,100	87,600	--
Black	63,400	--	--	--	--	--	--	--	--	--	--
Asian	55,900	--	36,400	51,100	55,100	66,800	--	--	--	--	--
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic (4)	49,300	--	--	--	--	--	--	--	--	--	--
Life scientists											
White	50,800	35,700	37,100	42,900	50,200	55,400	60,700	63,800	66,200	73,700	--
Black	46,300	--	38,400	43,800	48,800	53,700	--	--	--	--	--
Asian	50,400	33,600	35,800	44,800	51,800	55,200	60,500	56,700	--	--	--
Native American	51,100	--	35,100	--	--	--	--	--	--	--	--
Hispanic (4)	50,100	--	35,700	39,700	50,600	51,600	--	--	--	--	--
Psychologists											
White	50,200	34,200	37,100	45,900	50,200	52,300	57,900	59,800	66,700	66,300	--
Black	44,400	--	38,700	44,600	50,000	65,800	--	--	--	--	--
Asian	44,200	--	35,900	40,500	52,400	50,900	--	--	--	--	--
Native American	48,500	--	--	--	--	--	--	--	--	--	--
Hispanic (4)	45,700	--	36,800	48,900	57,100	--	--	--	--	--	--

See explanatory information and SOURCE at end of table.

Table 72. Median annual salaries of doctoral scientists and engineers, by field, racial/ethnic group, and years of professional experience: 1989

Page 2 of 2

Field (1) and racial/ethnic group	Total employed (2,3)	Years of professional experience									
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 and over
Social scientists											
White	$50,600	36,400	37,400	44,000	49,700	55,700	63,000	65,000	67,300	74,700	--
Black	47,200	--	36,300	42,600	48,300	52,700	--	--	--	--	--
Asian	48,200	--	38,800	41,000	52,200	58,600	--	--	--	--	--
Native American	48,000	--	--	--	--	--	--	--	--	--	--
Hispanic (4)	44,300	--	33,600	46,400	50,000	--	--	--	--	--	--
Engineers, total											
White	64,300	48,800	50,000	55,500	62,700	69,800	72,700	75,200	75,100	80,000	--
Black	55,700	--	48,500	51,700	59,500	--	--	--	--	--	--
Asian	58,400	46,000	48,500	56,100	61,200	60,900	74,600	--	--	--	--
Native American	--	--	--	--	--	--	--	--	--	--	--
Hispanic (4)	55,400	48,700	49,700	48,300	62,100	--	--	--	--	--	--

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes", page 69, for a list of fields included in the general field categories. Field represents the specialty most closely related to the respondent's principal employment. Individuals who did not report S&E employment were assigned the specialty of their doctorate.

(2) Includes scientists and engineers who received their doctorates between 1946 and 1988 and were employed full-time or part-time or held postdoctoral appointments in February 1989. All doctorate holders are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).

(3) Racial and ethnic categories are not mutually exclusive (Hispanics may also be included in one of the racial groups).

(4) Includes members of all racial groups

NOTE: All figures have been rounded.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations, tables B-66 and B-66A

Table 73. Median annual salaries of doctoral scientists and engineers, by field, sex, and years of professional experience: 1989

Page 1 of 1

Field (1) and racial/ethnic group	Total employed (2)	Years of professional experience									
		1 or less	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 and over
Total, scientists and and engineers											
Male	$56,000	40,400	42,800	48,900	54,800	60,400	63,700	67,300	70,000	75,100	70,800
Female	44,800	35,500	37,200	42,700	48,000	51,600	55,200	58,300	63,400	63,200	--
Scientists, total											
Male	54,500	36,700	40,200	46,500	52,400	58,100	61,400	65,100	68,100	73,100	69,800
Female	44,400	35,200	36,600	42,300	47,600	51,300	55,100	58,100	63,300	62,900	--
Physical scientists											
Male	57,100	40,600	45,000	49,500	56,300	60,500	62,500	66,500	68,100	70,500	
Female	47,500	39,900	43,000	46,600	50,500	50,800	52,200	54,500	80,200	--	--
Mathematical scientists											
Male	52,200	--	37,000	42,800	50,800	53,700	60,500	61,900	73,000	79,300	--
Female	45,200	--	37,100	39,600	47,100	51,300	54,100	53,800	--	--	--
Computer specialists											
Male	60,100	53,500	55,400	54,800	58,800	63,600	61,200	76,200	74,700	--	--
Female	50,000	48,300	45,100	49,900	51,100	56,500	48,000	--	--	--	--
Environmental scientists											
Male	55,600	34,800	39,000	48,000	55,100	61,800	63,300	70,600	74,700	87,000	--
Female	43,600	31,000	35,900	40,900	56,300	56,600	56,100	--	--	--	--
Life scientists											
Male	53,200	34,600	37,100	43,700	50,900	56,000	60,900	64,200	66,600	74,000	--
Female	43,100	35,700	36,900	41,700	46,200	50,400	54,500	58,100	59,600	--	--
Psychologists											
Male	51,300	32,900	38,400	47,500	50,600	52,700	59,000	60,300	68,600	66,600	--
Female	44,300	34,500	35,900	43,100	48,500	50,700	55,500	56,500	61,100	--	--
Social scientists											
Male	52,000	36,800	38,800	45,300	50,500	56,200	61,900	63,700	67,300	74,900	--
Female	44,200	34,000	35,200	40,600	46,400	52,900	58,600	65,400	66,800	--	--
Engineers, total											
Male	62,800	48,500	49,400	55,700	62,500	68,600	72,900	75,000	75,400	80,100	--
Female	53,400	47,700	48,500	53,800	61,600	65,100	62,200	--	--	--	--

Double dashes (--) represent too few cases to estimate; cells with fewer than 20 cases are not reported.

(1) See appendix A, "Technical Notes", page 69, for a list of fields included in the general field categories. Field represents the specialty most closely related to the respondents principal employment. Individuals who did not report S&E employment were assigned the specialty of their doctoral degree.

(2) Includes scientists and engineers who received their doctorates between 1946-1988 and were employed full-time or part-time or held postdoctoral appointments in February 1989. All doctorates are included, regardless of citizenship status (i.e., U.S. citizen; non-U.S. citizen, permanent visa; and non-U.S. citizen, temporary visa).

NOTE: Median salaries are computed for full-time employed civilians only. All figures have been rounded.

SOURCE: National Science Foundation, Science Resources Studies Division, Survey of Doctorate Recipients, unpublished tabulations, tables B-72, B-72A, and B-72B

BEST COPY AVAILABLE

Table 74. Selected characteristics of scientists and engineers with physical disabilities: 1986

Page 1 of 1

Field	Disability					Labor force status				Reason outside labor force			
	Total population	Visual	Auditory	Ambulatory	Other	Total population	Labor force	Total employed	Unemployed	Total outside labor force	Retired	Illness	Other
Total, scientists and engineers	94,200	21,100	16,500	20,500	36,100	94,200	71,400	70,300	1,100	22,900	16,400	5,300	1,200
Scientists, total	40,400	9,700	7,600	9,800	13,400	40,400	34,500	34,200	300	5,900	4,100	1,000	800
Physical scientists	7,600	2,500	1,100	1,400	2,600	7,600	5,300	5,300	--	2,400	1,600	800	--
Mathematical scientists	1,600	300	400	500	500	1,600	1,600	1,500	100	100	--	--	100
Computer specialists	9,200	1,800	2,700	3,000	1,700	9,200	9,100	9,100	--	100	--	100	--
Environmental scientists	3,000	200	400	1,300	1,100	3,000	2,000	2,000	--	1,000	900	100	--
Life scientists	6,300	1,300	1,200	1,700	2,100	6,300	5,700	5,600	100	600	400	100	100
Psychologists	6,100	1,100	1,400	1,200	2,400	6,100	5,400	5,400	--	700	400	--	300
Social scientists	6,600	2,600	400	700	2,900	6,600	5,500	5,300	100	1,200	1,000	--	200
Engineers, total	53,800	11,400	8,900	10,800	22,700	53,800	36,900	36,100	800	16,900	12,300	4,300	400

Double dashes (--) represent too few cases to estimate.

NOTE: Detail may not add to totals because of rounding.

SOURCE: National Science Foundation, Science Resources Studies Division, Scientific and Technical Personnel Data System (STPDS). Tabulations are published in Women and Minorities in Science and Engineering, NSF 90-301, January 1990, pp. 75-76.

Table 75. Self-identified physical impairments of science and engineering graduates, by type and degree level

Page 1 of 1

	Bachelor's recipients (1) (Total = 628,000)	Master's recipients (1) (Total = 114,200)	Doctorate recipients (2) (Total = 39,600
Percent with physical impairments, total (3)	1.0	0.4	1.0
Visual only	0.2	0.1	0.3
Auditory only	0.2	0.1	0.2
Ambulatory only	0.3	0.1	0.3
Multiple impairments	--	--	--

Double dashes (--) represent less than 0.1 percent.

(1) Bachelor's and master's degree recipients in 1988 who received their degrees in 1986 or 1987
(2) Doctorate recipients include those who received their doctorates in 1987 and 1988. ,
(3) Total includes respondents whose specific impairment was not reported

SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Recent Science and Engineering Graduates (1986-87 Graduates in 1988), and Survey of Earned Doctorates (new Ph.D. recipients in 1987 and 1988), special tabulations

Table 76. Postsecondary students, by major field of study and disability status: fall 1986

Page 1 of 1

Field of study	Students without disabilities		Students with disabilities (1	
	Number	Percent	Number	Percent
	Undergraduates			
	10,015,143	100.0	1,207,083	100.0
Arts and humanities	640,329	6.4	89,414	7.4
Business	2,811,444	28.1	294,823	24.4
Education	860,442	8.6	112,371	9.3
Engineering	950,488	9.5	118,413	9.8
Health	970,498	9.7	94,247	7.8
General studies	690,355	6.9	88,205	7.3
Natural sciences (2)	1,070,550	10.7	129,287	10.7
Social sciences	730,375	7.3	103,913	8.6
Trade/industrial	250,128	2.5	38,665	3.2
All other	1,040,534	10.4	137,745	11.4
	Graduates			
	974,056	100.0	89,090	100.0
Arts and humanities	93,509	9.6	9,533	10.7
Business	208,448	21.4	12,116	13.6
Education	218,189	22.4	22,629	25.4
Engineering	62,340	6.4	4,098	4.6
Natural sciences (2)	116,887	12.0	9,087	10.2
Social sciences	92,535	9.5	8,820	9.9
All other	182,148	18.7	22,807	25.6

(1) Includes students who reported that they had one or more of the following conditions: a specific learning disability, a visual handicap, hard of of hearing, deafness, a speech disability, an orthopedic handicap, or a health impairment.

(2) Includes students who majored in life sciences, physical sciences, mathematics, or computer sciences

NOTE: Detail may not add to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1987 National Postsecondary Student Aid Study. Profile of Handicapped Students in Postsecondary Education, 1987, CS 89-337, June 1989, p. 16.

STIS

The Science & Technology Information System at the
National Science Foundation

What is STIS?

STIS is an electronic dissemination system that provides fast, easy access to National Science Foundation (NSF) publications. There is no cost to you except for possible long-distance phone charges. The service is available 24 hours a day, except for maintenance periods.

What Publications are Available?

Publications currently available include:

- The *NSF Bulletin*
- Program announcements and "Dear Colleague" letters
- General publications and reports
- *NSF Directions*
- Press releases
- NSF organization charts and phone books
- NSF vacancy announcements
- Award abstracts (1989—now)

The goal is for all printed publications to be available electronically.

Access Methods

There are four ways to access STIS. Choose the method that meets your needs and the communication facilities you have available.

Electronic Documents Via E-Mail. If you can send E-mail to Internet or BITNET addresses you can send a specially formatted message, and the document you request will be automatically returned to you via E-mail.

Anonymous FTP. Internet users who are familiar with this file transfer method can quickly and easily transfer STIS documents to their local system for browsing and printing.

On-Line STIS. If you have a VT100 emulator and an Internet connection or a modem, you can log on to the on-line system. The on-line system features full-text search and retrieval software to help you locate the documents and award abstracts that are of interest to you. Once you locate a document, you can browse through it on-line or download it using the Kermit protocol or request that it be mailed to you.

Direct E-Mail. You can request that STIS E-mail you an electronic copy of every document that is added to the system. This is particularly effective for periodic and time-sensitive publications such as the *Bulletin*.

Getting Started With Documents Via E-Mail

Send a message to **stisserv@nsf.gov** (Internet) or **stisserv@NSF** (BITNET). The *text* of the message should be as follows (the Subject line is ignored):

Request: stis
Topic: index

You will receive a list of all the documents on STIS and instructions for retrieving them. Please note that all requests for electronic documents should be sent to **stisserv**, as shown above. Requests for *printed* publications should be sent to *pubs@nsf.gov* (Internet) or *pubs@NSF* (BITNET), and include the document name, number, and your postal address.

Getting Started with Anonymous FTP

FTP to *stis.nsf.gov*. If you cannot connect, try *128.150.195.40*. Enter *anonymous* for the username, and your E-mail address for the password.

Retrieve the file *ftpindex*. This contains a list of the files available on STIS and additional instructions.

Getting Started with the On-Line System

If you are on the Internet: *telnet stis.nsf.gov*. If you cannot connect, try *telnet 128.150.195.40*. At the login prompt, enter *public*.

If you are dialing in with a modem: Choose 1200, 2400, or 9600 baud, 7-E-1. Dial 202-357-0359 or 202-357-0360. When connected, press Enter. At the login prompt, enter *public*.

Getting Started with Direct E-Mail

Send an E-mail message to **stisserv@nsf.gov** (Internet) or **stisserv@NSF** (BITNET). The Subject field will be ignored. Put the following in the message text:

Request: stis
Topic: stisdirm

You will receive instructions for this service.

For More Information

For additional assistance contact:

E-mail: *stis-request@nsf.gov* (Internet)
stis-req@NSF (BITNET)
Phone: 202-357-7555 (voice mail)
FAX: 202-357-7663
TDD: 202-357-7492

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

RETURN THIS COVER SHEET TO ROOM 233 IF YOU DO NOT WISH TO RECEIVE THIS MATERIAL ☐, OR IF CHANGE OF ADDRESS IS NEEDED ☐, INDICATE CHANGE, INCLUDING ZIP CODE ON THE LABEL (DO NOT REMOVE LABEL).

SPECIAL FOURTH-CLASS RATE
POSTAGE & FEES PAID
National Science Foundation
Permit No. G-69

MIS505
MR. JONATHAN FIFE
ASSOC
HIGHER EDUC
STUDY OF
ONE DUPONT CIRCLE NW #630
WASHINGTON, DC 20036

OMB 3145-0058
PT 34, II,FF,DD

NSF 92-303

BEST COPY AVAILABLE